

COOP'S
SATELLITE
DIGEST



JULY 1981

APOLLOTM X9

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COOP'S COMMENT ON TECHNOLOGY

THE ULTIMATE...RECEIVER AND PRESSURE

I have been fortunate enough since this 'minor' technology revolution began to be at many right places at the right times. I met England's Steve Birkill and Canada's Rod Wheeler early on, back when the three of us operated just about the only private terminals in the world. I met Taylor Howard before he announced to the world his receiver design and I visited Robert Coleman when he was still using a converted TD-2 Bell receiver. I cherish these acquaintances and the opportunities each of these people have given me to learn more about what it is we are all trying to do.

During this past May I was able to see the operation of what many would call the 'ultimate satellite receiving system'. I touched it, played with the knobs, took off the cover and inspected the circuits and totally lost my voice. There was very little I could say except "Gee Whiz..." and "I cannot believe this". There I was looking at a box barely two inches square, which mounted at the LNA, and which turned the entire TVRO band...both vertical and horizontal transponders...into one single coherent group of 20 (24 had they all been active) TV channels. As I tuned the special receiver I saw Nickelodeon and then PTL and then WGN and so on pop up in sequence just as if the receiver did not recognize that half of these signals were vertical and half were horizontal. The amazing two inch square box did it all.

I have championed the US technology lead in low cost TVRO hardware from the moment that our innovators got turned loose on the problems. But I have warned that sooner or later there would be a serious intrusion on our technology from an offshore group. Sooner, or later, is here. When I took the cover off the two inch square box I about fell over. I am not an electronics heavyweight but in five minutes I could have memorized everything I saw and have left the room long enough to sketch the entire system on a piece of scrap paper. The temptation to do this was unreal. Even with a 30 second look I retained enough to go home and do it myself...if I wanted

to do so.

I suspect there may be \$500 in the LNA plus two inch square box I looked at. That alone is enough to shake you up. But when you also realize that this system can do that magical balancing act of putting vertical and horizontal signals **together**, exactly equal in signal strength, and lay them across the tuning dial one after the other as if they were together in the first place; and you realize that this full band of 'married and balanced' signals can then be transported from the master receiver to 'slave receivers' through either low-cost coaxial cable or even through the air (as in broadband LPTV), well...it is enough to take your breath away.

I believe there are fewer than ten people in the world who have seen this system work. Perhaps four of us have seen inside the magic box. The security surrounding this project is unreal. It is straight out of James Bond. Someday, when I am allowed to do so, I will write about the people who travel quietly and swiftly in private jet aircraft from continent to continent working on this project, carrying with them in a small briefcase not only a complete TVRO receiving system but a complete TV transmission system that allows the terminal's multiple channels of service to be transmitted through the air for hundreds of square miles around.

For my part I am a mostly silent observer, in awe. I have asked those responsible if they would agree to show off the system in Omaha this summer. **They said no** (emphatically!) quickly. I have not given up however. I proposed that since they wish their own identity with the project kept totally under wraps that they button up the equipment in totally secure housings, and allow me to find a non-related but respected industry supplier to place the equipment on operational display. I offered to hand carry it from the source to Omaha, and to arrange for a stand-aloneside security person to insure that the devices in question never leave the area even for a moment. They are considering it and I'd say we have a 50-50 chance.

Complicating the Omaha display problem is the international marketing effort underway. I doubt this equipment will be sold in the US or Canada anytime soon. There are 'target' nations which have new, rapidly developing domestic satellite systems where it fits perfectly.

There will be a 'test market' and 'field trial' of this system someplace in this world before 1981 is over. A major segment of an entire nation will have it operational and the residents of this area will have in-home receivers connected to the 'master terminal' many miles away. **Each home will independently tune in all of the transponders offered on the test bird in use.** Through the one master terminal, hundreds or thousands of homes can plug in 'slave receivers' that will sell in the marketplace for probably under \$500 each. Oh yes, that \$500 includes the cost of the television receiver itself.

Keep your fingers crossed for Omaha. It could be quite a show!

CSD
TECHNOLOGY



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FILTERS CAN ELIMINATE TERRESTRIAL INTERFERENCE

Wipe It Out

Interference to satellite TVRO terminals from terrestrial sources has been one of those 'bad apple' problems since terminals began sprouting up nationwide. Terrestrial signal sources in-band (i.e. operating between 3.7 and 4.2 GHz) are common in metropolitan areas since this band is 'shared' between point to point (terrestrial) microwave and satellite microwave universally. This was no accident; it was planned that way by the FCC and other frequency regulatory agencies charged with obtaining maximum utility from a finite spectrum width. In fact you see indications that the terrestrial services were in place 'first' in the rules governing the satellite service. For example, the 30 Hz dithered waveform is required by the FCC; an attempt to 'frequency modulate' the satellite video signal so that it wanders around within the design channel at a 30 hertz per second rate, and is therefore less likely to 'land' on a terrestrial circuit sharing the same band of frequencies long enough to do harm (i.e. cause interference) to the earthbound signal. Or, the EIRP levels we find operational from SATCOM, WESTAR and COMSTAR birds are somewhat restrained because of similar concerns for non-interference to terrestrial signal sources.

The bottom line is that the satellite signals have a secondary 'legal' status in the scheme of things from 3.7 to 4.2 GHz, and while a properly licensed TVRO can exert certain rights and privileges to guarantee that no **new** terrestrial microwave links are built that will interfere with the operation of the TVRO, those terminals operating **without** a license or going into operation where terrestrial point to point circuits already exist are simply taking their chances with interference.

Protecting your 'rights' to interference free reception at the FCC involves the following decisions on your part:

- 1) First you order up a 'frequency coordination survey' from a firm such as COMSEARCH or COMPUCON. This study, costing between \$900 and \$1200, will detail in a form acceptable to the FCC whether or not you can build a terminal in your chosen location **today** and be interference free. You can also elect to spend approximately \$100 or so to determine with a 75% or better degree of accuracy whether the site appears 'clean' on paper. It is sometimes wise to spend \$100 **first**, and then having found the site 'clean' proceed with the full and more expensive licensing package.
- 2) With the computer created data developed from the frequency coordination study your FCC application for a

licensed TVRO proceeds to work up. Once completed, it goes to the FCC where it begins a 45 to 60 day period of hanging around marking time. Eventually, after mandated and internal 'resting spells' the Commission grants you a TVRO license. During the period of time your license application is on 'hold' at the FCC other parties (such as the local telephone company) have the right to inspect your application and file an objection to the grant of your license. They would file because of plans they have to create a terrestrial point to point relay link through your area and because they know that if your license is granted they will have to divert their microwave link to avoid your site. Provided...

- 3) Once you have your license in hand, **you must protect it**. That means that while the FCC approved your application for a license and agreed with you that you will have no interference **today**, that in the future you must maintain a constant vigil against other applications by the telephone company (or others who might build 3.7 to 4.2 GHz terrestrial circuits). Your FCC license does **not guarantee** that you will be protected **by the FCC** against encroachers on your territory; only that if such applications are filed with the FCC in the future that you **then have the legal right** to object to the new applications being granted. That's right; you do not get automatic interference protection with a license. You get the legal right to protest, in the future, if such a system is planned in your area. Without a license for your terminal Ma Bell or MCI or another user of the 3.7 to 4.2 GHz range can build new circuits where they wish and even if you happen to learn about their plans and file a protest at the FCC, your non-licensed status will mean that you will have **no legal grounds** for the protest. The FCC will dismiss your objection and you will get zapped with interference.

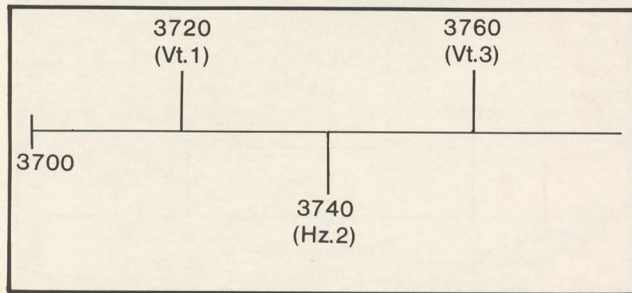
It is probable that with the exception of route re-building in metropolitan areas, to accommodate new growth patterns in housing and business, that **most** of the 3.7 to 4.2 GHz circuits to be with us over the next 20 years or more are pretty much in place already. To the Bell system, the 3.7 to 4.2 GHz band is considered a major 'trunk' package; that is, it forms the backbone for the transmission of a very high percentage of all television and radio and telephone communications shipped around North America. However, expansion of Bell circuits is going more and more towards satellite connection and Bell plans to convert much of the existing terrestrial telephone circuit trunk use to satellites over the next ten years. With this gradual but ongoing shift, the use of 3.7 to 4.2 GHz for coast to coast **trunking** is likely to disappear, or in the worst case be retained for emergency backup when satellite circuits fail or are overloaded by unusually heavy use (such as Mothers Day).

Still, many TVRO systems do have terrestrial interference today and the prospect is that with a thousand or more new terminals being installed each month the frequency with which the installer finds himself facing this problem will increase. Until very recently there has been only one way to deal with the problem; move or shield the TVRO antenna from the terrestrial source so that the interference was eliminated or reduced to a tolerable level. Now, thanks to recent advances in receiver technology, there is another tool available to the system installer.

Basic Interference Format

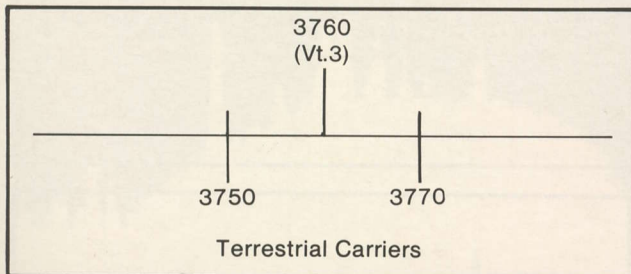
You will recall that 24 channel satellites manage to squeeze 24 TV signals into a spectrum barely wide or big enough for 12 by utilizing a technique of offsetting signals within the band by 20 MHz, and then by transmitting the adjacent offset carriers on the opposite polarization. To refresh your memory, transponder 1 (vertical) operates with a center carrier frequency of 3720 MHz while transponder 2 (horizontal) operates with a center carrier frequency of 3740 MHz. This 'interleaving' of polarizations with 20 MHz offsets results in your being able to use separate feeds or rotating

by
Keith Larson
VP, Special Products
Standard Communications
Los Angeles, CA 90009



your single feed to select the offset carrier set you wish.

Terrestrial circuits are also offset (on purpose) from the satellite signals. However, their offset is **10 MHz** (either plus or minus) rather than the 20 MHz we find between odd/even/odd satellite video carriers. The satellite planners selected the present satellite transponder frequencies so that this 10 MHz offset would exist as an additional means of reducing potential interference to terrestrial point to point microwave sites from distant satellite signals.

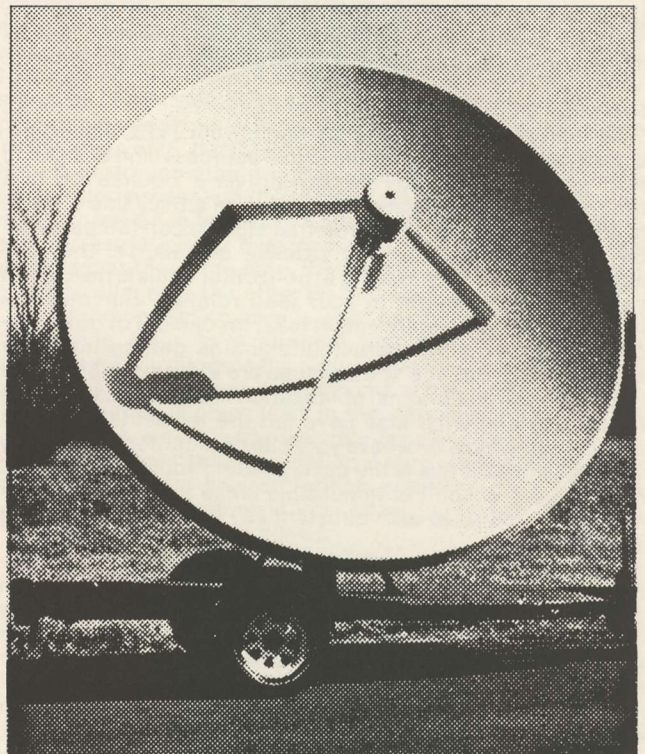


Interference from a terrestrial microwave source appears as either bars or lines of interference, or as 'white noise' (the same effect one sees when the satellite signal is weak). The interfering **carrier** being ± 10 MHz from the satellite video carrier center frequency is not too much of a problem but the frequency modulated 'sidebands' are. When the terrestrial circuit is heavily loaded with traffic, you have a fairly wide modulation index at work and this widens or stretches out the carrier from its relatively harmless ± 10 MHz center frequency (reference your desired TVRO carrier) to perhaps 2 to 4 MHz of bandwidth. **Now** the point to point carrier is sending relatively high energy 'sidebands' up or down into the same portion of this 'modulation energy' which degrades or wipes out the satellite video reception.

You will recall that satellite 'channels' are based upon 40 MHz centers and that the significant energy is contained in less than 36 MHz. The satellite video carrier is deviated by the baseband energy (and sub-carriers) present plus or minus some number of MHz from the center frequency carrier spot. The 'high resolution' commercial receivers typically have IF bandwidths between 27 and 32 MHz (± 13.5 and 16 MHz wide) while some of the 'threshold extension' approaches narrow the IF bandwidth to as little as 22 MHz (± 11 MHz) to derive slightly improved carrier to noise ratios. However some of the 'studio quality' detail one sees and exclaims over with the higher priced commercial receivers is due to their maintaining a wide IF bandwidth; that extra bandwidth provides additional FM sideband information which eventually shows up on the screen as improved picture resolution.

Into this 'mixture' we have the appearance of an unwanted carrier with its own modulation products, falling as it does ± 10 MHz from our center frequency carrier and then 'deviating' over a range of perhaps 4 MHz. The trick, if that is the correct term, is to get that carrier/sidebands out of your video passband without messing up the satellite video in the process.

The device to accomplish this is a trap; an electronic circuit



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that adds into the receiver within the (typically) 70 MHz IF chain and designed so that energy that falls inside the 'window' established by the interfering terrestrial link is caught and kept from passing on to the receiver demodulator.

Practical Experience

Terrestrial signals may be arriving at your TVRO site from a **direct path** (i.e. the terrestrial signal source is 'line of sight' to your location) or it may be arriving via a 'bounce' off of a nearby hill, building, water tower or even a thick line of trees (with heavy foliage). The terrestrial signals can (on purpose) be cross polarized to your satellite signals; i.e. they are vertical while you are looking at horizontal. If this is the case, a very slight adjustment in your feed rotation can 'null' the interference completely out; at least for one set of transponders. However if the terrestrial signal is getting into your terminal via a 'bounce' the chances are at least 50-50 that in getting to you the original polarization has been 'skewed' (as in warped) and what may have left the terrestrial site as a vertical signal now arrives at your site as a 'canted' or **halfway vertical** signal. If this is the case, rotating your feed for a null may be very difficult or impossible since the null will occur only after you have also substantially reduced the desired satellite signal.

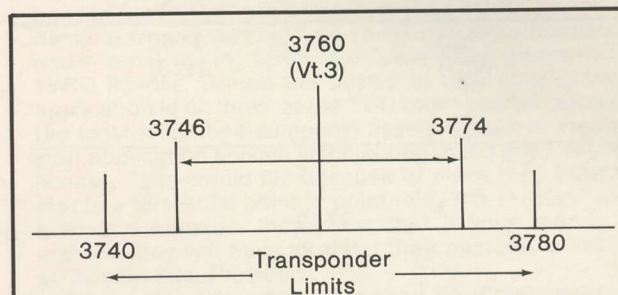
In other instances the terrestrial interference can be eliminated or reduced by simply moving the location of the dish antenna by a few inches or feet. This is one of the reasons why in metropolitan areas at least it is advisable to keep the antenna on the trailer until you have clean pictures; it is far easier to move a trailer than a dish tied to a block of concrete!

If your feed is out in the open (i.e. a simple horn feed as an example) and the probe in the LNA is not well shielded, constructing a secondary ring or shield around the feed may also reduce the terrestrial energy that is getting directly into the feed (i.e. not getting to the LNA probe **via the dish surface** but rather by **direct feedhorn pickup**). One trick of the trade is to demount the LNA and feed from the dish focal point and simply rotate the demounted pair of units around you. The terrestrial signal will often be strong enough that you can pinpoint the direction it is coming from by observing a signal level meter or TV set. By getting a 'fix' on the direction it is coming at you, you may be able to map out a strategy to move the dish slightly to put something between you and the source to act as a 'block' on the terrestrial energy.

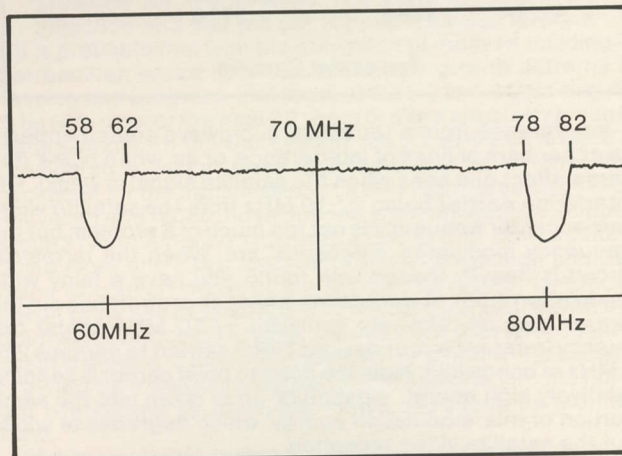
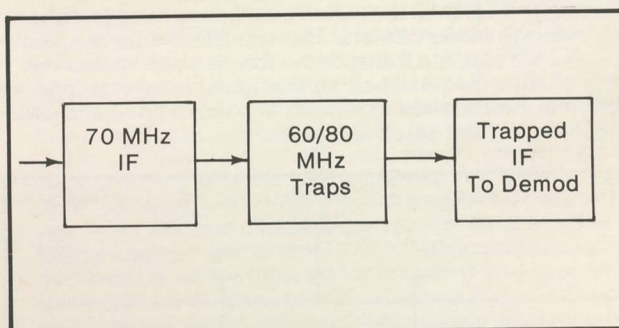
When all else has failed, you are ready for a 70 MHz IF filter designed to trap the energy out of the receiver ahead of the demodulator. Such a filter has recently been added as a \$200 option to the Standard Communications Agile 24 line of TVRO receivers (*). And while I have no desire to diminish the market attractiveness of the Agile 24 receiver I should point out that anyone familiar with the design criteria given here plus the world of filters could design their own filter for virtually any TVRO receiver circuit now in use (**).

* - Standard's filters may not be compatible with other 70 MHz IF receivers although you can investigate this by talking directly with author Larson at (213) 532-5300.

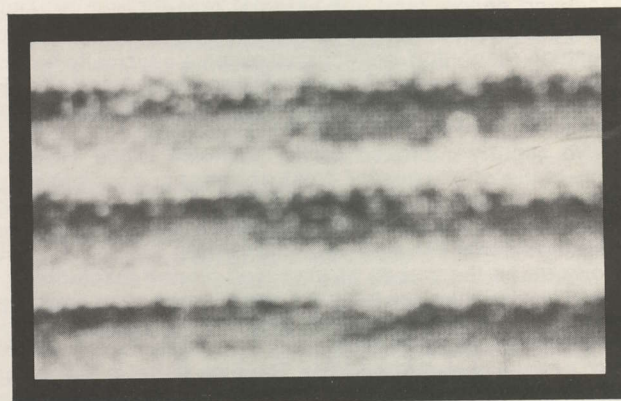
** - Close inspection of the 70 MHz filter design found in the Taylor Howard STT Manual will suggest ways of adding on the filter board one or two additional 'traps' capable of being tuned to the offending carrier frequency. As a test you could perhaps retune either the low notch or the high notch traps already on the filter board just to see what could be done with reducing an interfering carrier you may have. Yet another (untested) source for this type of trap would be Microwave Filter Company (attn: Glyn Bostick), 6743 Kinne Street, East Syracuse, NY 13057. MFC manufactures a sizeable array of filters and traps for similar purposes and is not adverse to creating a 'special unit' if they can be convinced there is a market for it.



Significant Modulation (video information) typically found +/- 14 MHz of center carrier frequency.



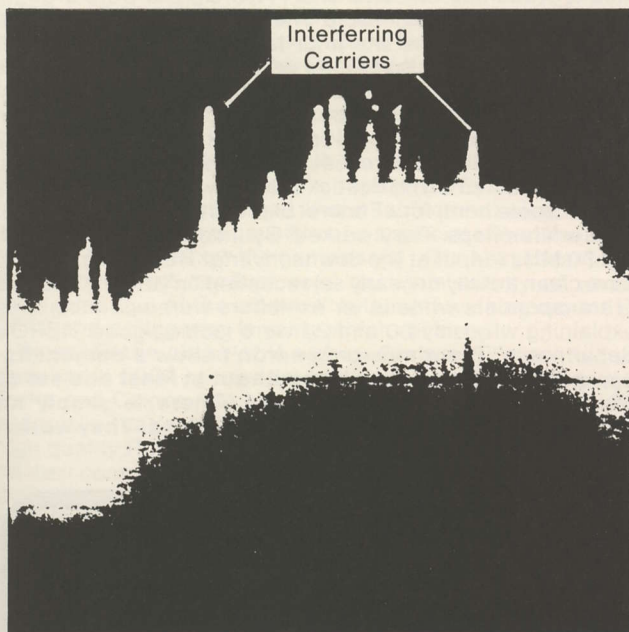
In the tests shown in photographic and diagram form here, performed at the plant location of Robert Luly & Associates in



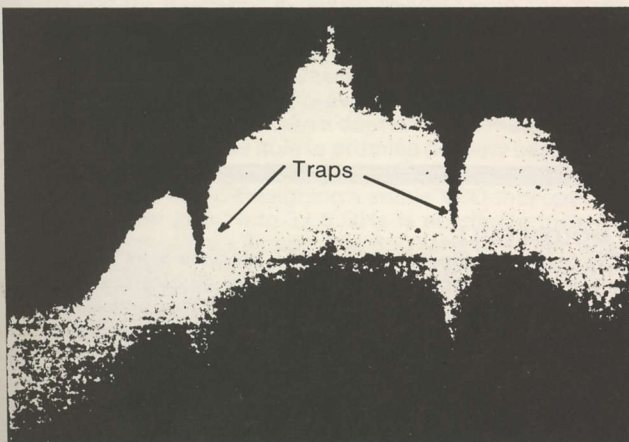
TWO INTERFERING CARRIERS wipe out transponder 1 reception at Luly test site.



NICKELODEON programming brought through interference after installation of two traps.



LULY TESTS - Transponder 1 with a pair of interfering carriers (left hand carrier equal in strength to peak of TVRO signal). Carriers not heavily modulated (loaded).



30 dB or more down - trap 'sucks' energy out of passband in the region centered on the two transponder 1 terrestrial carriers.

San Bernadino, California we find a pair of interfering carriers on channel one, and the effect of trapping those carriers; and a single interfering carrier on channel 23, and the effect of trapping that carrier. Remember that your unwanted terrestrial carriers will always be offset from the desired TVRO signal by 10 MHz although as you can see you may not have a pair (one on **each** side). In the 'real world' adding a trap to the TVRO receiver IF, designed to trap the offending carrier(s), is bound to do something undesirable to some of the video information present on the satellite signal. This should be no mystery; we do in fact have both satellite video information **and** terrestrial circuit data occupying the same part of the spectrum at the same time. If we eliminate one, we are also going to eliminate the other (in that spot)!

Based upon testing here is what has been found:

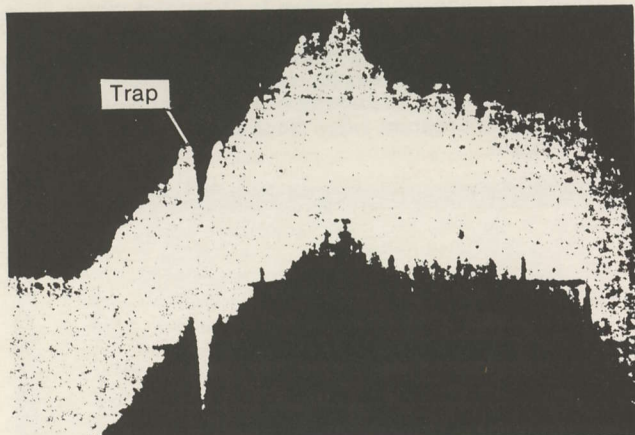
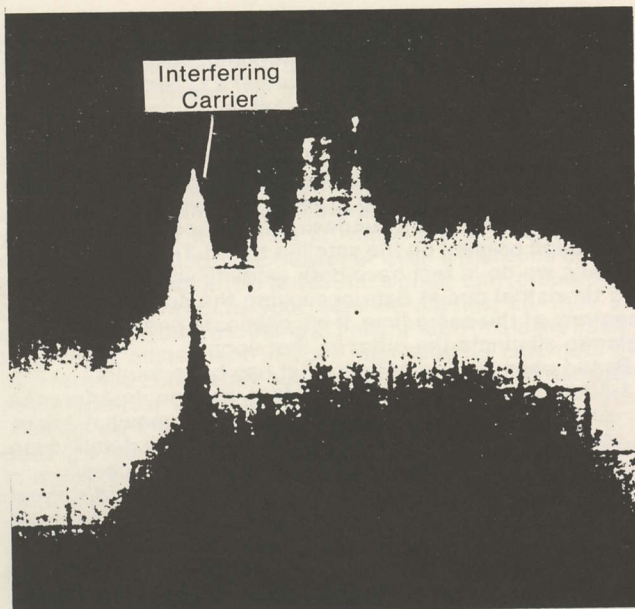
- 1) Adding traps to a channel that has no interference present will degrade the picture quality somewhat. Again, that is to be expected since some of the 'fine detail' video information is being 'lost' in the trapping process.
- 2) With only a **single** trap (i.e. trapping one side) and 'normal video scenes' the degradation is not noticeable. However on color bars you will notice sparklies on a channel without interference if you were just above threshold before the trap was added.
- 3) On signals where the interfering carrier(s) is (are) so intense that the satellite video is unwatchable, you can expect to clean up the video to the point where it is enjoyable if not studio perfect (see photo of ducks). On signals where the interference is from a single carrier that is causing mildly distressing amounts of picture jitter and 'sparklie like noise' the addition of a trap can be expected to bring the program video back to an enjoyable level once again.



SINGLE INTERFERING CARRIER wipes out 'super hero' with sparklie noise.



TRAP INSTALLED brings white noise out of picture and restores reasonably high quality video.



LULY TESTS - Transponder 23 with single interfering carrier (left of center; nearly equal in amplitude to peak satellite video); heavily (i.e. broad appearing) modulated.

Knowing the exact nature of your problem is very important. One of the best ways to do this is to connect a spectrum analyzer (adjusted for 5 MHz per division or so horizontal) to the 70 MHz line in the receiver. The drawings here were created from spectrum analyzer photos which clearly showed the presence of the pair of interfering carriers on TR1 and the single interfering carrier on TR23. With an analyzer you can see 'before' and 'after' effects of the traps and be certain that what you set out to get rid of is actually gone after the traps are installed.

This final point. Traps that are too narrow will capture the offending carrier but the (typical) FM swing of the carrier will boil on through to the receiver demodulator. Traps that are too wide will capture the offending carrier plus FM swing alright, but in the process they will also attenuate more of the satellite video information than you can stand to 'lose'. Remember every MHz of trapped energy takes with it some of the satellite video information in the process so trap design must be tailored to the demands created by the way the interfering carrier is modulated and the level of the signal which you have at your location.

TRAPS SAVE THE DAY AT CES

Each year in late May / early June the Consumer Electronics Show (CES) invades McCormack Place in downtown Chicago. Hundreds and hundreds of equipment manufacturers show off their video tape machines, record players, CB sets and an endless array of electronic gadgets to dealers and distributors who travel from throughout North America to see "what's new". This year 14 private TVRO hardware firms also were on hand to display their equipment.

The downtown Chicago location is a bad one. Very severe terrestrial interference from well elevated Bell microwave circuits spray C band signals all over the countryside. Tall buildings bounce the signals hither and yon and there are no good locations for bird reception. On Lake Michigan, at the show's exhibit hall, is one of the worst locations of all.

Equipment supplier HERO Communications came prepared. First there was the antenna run; some 600 plus feet from the location set aside for antennas to the exhibit booths. HERO tackled that one by having Andy Hatfield modify an AVCOM receiver to allow the 3.7 / 4.2 GHz downconverter to mount at the antenna site. The TVRO signals were brought inside in 70 MHz small cable. Then there was the terrestrial problem. Tests at the site prior to the opening of the CES gathering indicated that at the very best only transponders 20 and 24 were 'clean' of terrestrial interference. Anxious to have clean signals and not be placed in the delicate position of having to explain to would be reps, distributors and dealers what terrestrial interference was all about. HERO's Bob Behar contacted Glynn Bostick of Microwave Filter Company (see footnote here) for a Federal Express shipment of some of MFC's filter/traps. They worked. By inserting the traps into the 70 MHz output at the downconverter HERO managed to have clean (totally or nearly so) reception on virtually all of the FI transponders while other exhibitors were spending time explaining why only 20 and 24 were looking good. HERO's Behar notes **"From now on we won't allow a demonstration trailer to leave our plant without at least one set of 60/80 MHz trap filters on board. There is simply no excuse for operating without a set on hand. They work."**

THE COMM-PLUS TEKNIMAT 692A RECEIVER

A MOUTH FULL

The history of the Teknimat 692A receiver is as follows. The unit was conceived by an Argentinian electronics engineer now living in Canada (Daniel Bernesi). The unit was to be marketed by Canada's CommPlus with Chris Schultheiss and Nelson Ethier involved. And it was to be shown in operational advanced proto-type form in San Jose just one year ago.

On schedule the first unit arrived with Chris and Nelson in San Jose for last summer's SPTS. As luck would have it, the receiver in being shipped from Montreal to San Jose apparently was used as a football and when the container arrived in San Jose both the outside of the shipping container

and what was inside was terribly damaged. In spite of this Chris and Nelson were able to patch it back together and while it suffered some physical blemishes caused by being mistaken for a pigskin it did perform quite well in San Jose.

After San Jose the arrangements between the marketeers and the designer/builder got rather involved. You don't jump into the production of even a modest number of sophisticated TVRO receivers with a dollar ninety eight in your pocket. And that took some time to sort out. By the time we all got to Houston there were a few units available but they still had that advanced prototype look and it was apparent the assembly line was not yet operational. This time the units arrived in good shape (aluminum shipping cases do wonders for football playing baggage handlers) and many people observed that the equipment had a very professional look and feel to it. But volume production was still a ways away.

Just before the Washington SPTS all of the pieces finally came together for CommPlus and we saw our first in-field 692A at Hero Communications as we came through the South Florida area on the way to Oklahoma ten days prior to SPTS in DC. We talked briefly with Bob Behar about his opinion of the unit (he was anxious to handle them if they worked properly) and frankly Bob had a negative opinion. We tucked it away in the back of our mind.

In Washington we spied a considerable stock of the Teknimat 692A receivers in both the National Microtech booth and the CommPlus booth. A few others were scattered here and there in the booths of antenna suppliers. We felt that was a good sign since those firms who manufacture antennas and don't deal in receivers usually make a special effort to select a receiver that will show their antenna(s) off to best advantage. You can in fact conduct your own mini-survey of which receiver is "hot at the moment" by simply walking around at SPTS and noting who is using which receiver.

Towards the close of the show Chris and Daniel told us they had a 692A receiver ready for us to bring back to the Turks and Caicos. We had spent some time in their booth, especially the last (Sunday) afternoon witnessing the very high quality Russian Ghorizont reception which was playing off their companion 12 foot dish and we were anxious to see if the receiver would make the trip to the Turks and Caicos and still play properly. Regular readers of **CSD** will recall that not everything gets down here in one piece.

The 692A receiver is quite different in design than most other receivers on the market. Daniel Bernesi has an engineering mind that is all his own and for better or worse he is not a copycat. This is not another one of those PLL demod boxes.

The 692A is a dual conversion receiver and it translates the 3.7 to 4.2 GHz input signal range down to 550 MHz IF. It does this by mixing a Teknimat designed VCO with the single incoming satellite video signal and ending up at 550 MHz. The VCO tunes through the 3.15 to 3.65 GHz region. Daniel took this approach since he was not that happy with the price nor the delivery time of readily available VCOs. He felt that if his receiver was going to make a dent in the marketplace they were going to have to be able to promise delivery based upon his own skills; not the seemingly endless delays caused by subsuppliers of VCOs. Designing a stable VCO that operates to drive a mixer at 3.15 to 3.65 GHz is no simple trick; you don't do this by being a slouch. The 550 MHz IF is then again converted, down to the pretty standard 70 MHz IF, where it is amplified and leveled and finally detected. The 70 MHz IF has up to 70 dB of gain and the IF bandwidth is an extremely flat 30 MHz. Daniel's approach to final picture quality is interesting; he supplies automatic gain control through a precision limiter that operates just ahead of the delay-line type demodulator. This insures that the signal to the demod is held very constant and Bernesi suggests this provides exceptionally good performance with at, or below, threshold signals.

After the demodulator Bernesi does another creative bit of engineering. Following a low pass filter and CCIR filter

TEKNIMAT 692A RECEIVER



Tuning Range.....	3.7 to 4.2 GHz
First IF.....	550 MHz
Second IF.....	70 MHz
IF Bandwidth.....	30 MHz
Demodulator.....	Delay Line
Video Processing.....	Active Line
Audio Subs.....	6.8/6.2
Polarity Switch.....	Yes
LNA Powering.....	Yes
Apparent (*) Threshold.....	7.0 CNR

* - determined by comparison

Options:

- Wired remote control
- Wireless remote control
- Additional audio (2)
- ANIK audio filter
- Continuous audio tuner
- Isolator/filter
- Auto polarity rotor control
- Time/transponder character generator

Price Range..... \$2,000

Available From:

Comm/Plus, 3680 Cote Vertu, Montreal
Quebec, H4R 1P8, Canada (514/337-7255)

there is a video amplifier. From this video amplifier the signal goes through a circuit called an "Active Line Processor". Each line of the video signal is sampled by the circuit and if there is a black (reference) level error detected a correction signal is created.

Over on the audio side a limiter/quadrature detector (preceded by proper subcarrier bandpass filtering) demodulates the audio subcarrier. There is room on the receiver master board for four audio demodulator cards covering any four pre-set audio subs you might wish. Because, perhaps, of their Canadian heritage a special ANIK 5 kHz active filter board is available as an option for those who cannot stand the constant 'tinkle-tinkle' that comes with virtually all of the ANIK audio when it is recovered with a standard audio circuit.

The receiver has a number of interesting operational features:

- 1) LNA powering is provided;
- 2) Standard audio provided is 6.2 and 6.8 MHz;
- 3) A 'scan' feature allows you to put the receiver into a channel hopping mode which means you can put your hands back to work moving an antenna around while the receiver does the job of searching for signals;
- 4) The signal level meter works in reverse of what you expect it to; it is a **noise meter**, and when the meter reads **minimum** you have the best looking picture (i.e. maximum signal and minimum noise);
- 5) The AFC (automatic frequency control) is switchable with

The ICM Tunable Audio

- For Use With All Satellite Receivers*
- Single Knob Tuning
- Mono and Stereo Outputs

The ICM Tunable Audio is designed for use with all satellite receivers having a *subcarrier or unfiltered video output. Input levels in the -30 db to +10 db range are acceptable. BNC and phono inputs are supplied. Output connectors are RCA phono type.

Specifications:

Built-in AFC
Tunes 5.5 to 8.5 MHz
Stereo Decoder Standard
Separate Mono and Stereo Outputs
Output Level 1V P.P. Nominal
Separate Power Transformer
Small Size

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1-4 PRICE



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10 North Lee, Oklahoma City, Oklahoma 73102
405/236-3741

a front panel switch and it works in tandem with a second front panel meter that is supposed to indicate zero (center scale) when a signal is properly center tuned;

- 6) A 'clock' built into the front panel of the receiver allows you to program the receiver for automatic turn on and turn off and through a set of rear panel jacks when the receiver turns on you can also optionally engage the start-up operation of a home VTR/VCR. This allows you to tape an event while you are away from home and not leave your TVRO receiver running fulltime.
- 7) Channel selection is with a set of push buttons which are coupled to a digital display. The display indicates the transponder you are on and to the right it has a little display that tells you whether you are tuned to a vertical or horizontal transponder. The 12 channel birds (WESTAR, ANIK) will all indicate vertical when in truth they are all horizontal but only a purist would object to that display anomaly.
- 8) The clamping approach is very sound with 40 dB of dispersal rejection; you should not see 'flicker' on the video of a 692A.

This is not your **small** receiver box. It measures 20 by 15.5 by 8 inches in size and it does not fit into a standard electronic equipment rack (!). In fact, it has been designed to look like a fancy, top of the line piece of audiophile gear. If your customers measure the 'return on their TVRO investment' by the size and appearance of the satellite video receiver, Comm-Plus has a winner in that department.

Now, we have a collection of receivers down here in the islands that is probably second to none. It should be noted that when we returned from Washington we brought with us two other relatively new receivers for test. One of these did not play at all when it got here (we strongly suspect it didn't play when it left the factory, because of the nature of the ailment) and the other will eventually play (although how well is to be determined) after we can find a few spare hours to do a re-alignment job. **We had virtually no confidence** that the 692A was going to survive the multiple-shippings and arrive down here in working order. We were so sure that this would be the case that we left it packed in its shipping case for a full two weeks after getting back; not anxious to see how badly it survived the shipping exercise. Our logic, which turned out to be illogic, was that anything this complex and this complicated simply didn't stand a chance of arriving still working properly.

We were therefore very surprised and pleased when we finally hooked it up one day and found instant video and audio pouring from the spigots. With three Washburn/Earth Terminal receivers, an ICM and a Microdyne in fulltime, regular use for WIV-TV, and a collection of another ten or so performing standby and shelf duty around the facility we have no difficulty comparing which receiver performs best and where.

The where, you may recall, boils down to the simple truth that we have **yet to find** any receiver from any supplier that works the best on **all** transponders under **all** conditions; **all of the time**. One of our Washburn's is hotter on the high end than the low end; another works better on WTBS than it does on WGN while an ICM is the best receiver in the house for WGN.

Into this bewildering world we plugged in the 692A and did a quick set of comparisons of it against two Washburn receivers operating in our horizontal polarization line. Humm. The 692A did just as well transponder for transponder as the Washburn. **Except** at the very high end of the band (transponder 24) where while the video signal to noise ratio was still good we found an indication that there was some type of (undesirable) beat in the picture. Not enough to bother most people, but it was there. On transponder 6 (WTBS) we did a more critical test. WTBS was having one of their fits with power outage so a color bar pattern was up on the screen; we switched on the waveform monitor and took a look at the stair

step pattern. Humm again. The 692A was measurably cleaner than the Washburn. We hadn't noticed this on our color monitor however so we brought in a 21 inch monitor to replace the small 7 inch studio monitor and looked again. Yup, there it was. The edges of the color bar pattern were sharper through the 692A.

Next we switched the 692A over to the vertical side and there it was running against another handpicked Washburn and the best ICM we have ever seen down here. We run the ICM on WGN fulltime and the vertical Washburn moves around on the other vertical transponders. Now the WGN signal presents some unique problems to anyone trying to recover it in a below threshold situation. First it has a pair of additional subcarriers which carry WFMT and the Seeburg background music service. They rob upwards of 1 dB of transponder power from the video service. Next the audio deviation on the WGN main audio subcarrier at 6.8 MHz is often 'noisy'; and not just because the carrier level is down. Finally United Video, the WGN common carrier, or RCA's uplink station at Lake Geneva, Wisconsin frequently omit or butcher the 30 Mz energy dispersal waveform on the uplink. Through all of this anyone who wants to recover a **good** WGN signal has to keep a wary eye peeled for their latest trick problems. As noted, the ICM TV-4000 has resolved these problems for us in the most satisfactory manner since we got it down here in mid-March or so. Yes, **for WGN** it outperforms a Washburn, the Microdyne, et al.

After ten minutes of testing against the TV-4000 and the Washburn receiver dedicated to vertical channels we unplugged the TV-4000 and stuck the 692A into the full time service slot on WGN. Now remember that the 692A uses a delay line type of demodulator and this should in theory be an approach that will produce better video **fidelity** than **any** PLL demodulator. Even with the fancy tricks Clyde Washburn does with a high quality PLL device, a **well designed** delay line demod backed up with a **good** video processing system should make the video 'snap out at you' the way no PLL can do. In the video quality department, the Washburn PLL has been tops with us since we got our first unit down here; especially with our slightly below threshold signals. (In truth, on the stronger WESTAR signals, the Microdyne demodulator has the best pictures; but when the signals get weak the Microdyne falls down rapidly and that's where the Washburns have proven themselves.) The TV-4000 has been second best in this department and then there is a long string of also rans. After switching to the 692A we have to move everyone down a notch; **it clearly** (pun intended) **has the best looking high definition video**. And combined with the 'equal to Washburn sensitivity' this gets it high marks across the board.

But (unfortunately) not on all channels across the full band. Between the different energy dispersal formats, the sloppy uplink video techniques, and even the sloppy uplink RF modulation techniques one finds across the birds today there is no such thing as the **best** receiver for **every** situation. And that aside, the slight beat we see in our 692A at the high end of the band (23 on vertical and 24 on horizontal) is enough to keep us from using the 692A for serious receiver purposes in **that portion** of the band. For home use, we doubt anyone would complain and most probably would not notice it. We did.

We hesitate to label the 692A as 'the best' receiver we have seen here for all of the reasons given. Here are a couple of additional reasons why we don't give it A+. The clock function drives us crazy. We finally went inside and unhooked it since it either cannot operate properly or will not. Perhaps it suffered in shipment (seemingly sending a digital clock down here would be safer than sending a TVRO receiver!). The AFC metering ("tune for center tune/zero") also bothers us. The manual explains how to correct this and then admonishes you "**not to worry if the meter is not centered when the AFC is turned on**" since (they say) "**this is normal and**

allows the user to monitor the amount of correction being generated". In the real world the center tune meter reads anything but center tune and it varies from transponder to transponder. We don't care for a meter that doesn't read the same, transponder after transponder. We had to make up a correction card and paste it on the front of the receiver so we know when we are properly center tuned for **each** channel. There **is** an alignment process covered in the manual to correct all of this but we found some instability in the meter readings (although **not** the receiver AFC action; it is rock stable) even after going through this exercise.

This is a very good receiver. We nit-pick because we feel to do anything less than a thorough analysis would be a disservice to readers. We recognize that many readers react to our equipment reviews by ordering equipment we rate high here. And we don't want anyone getting any surprises.

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**National
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Now early on we reported that Bob Behar's early experience with a 692A was not satisfactory to him. In May we were in his shop again and he had **another** 692A running. We both remarked on the high quality of the video, and then he turned up the audio. It had a deep bass sound which was clearly bad to both of us. That was before I had unpacked our test unit and frankly that quick demonstration by Bob didn't send us home anxious to unpack the 692A. **Ours does not have bassy audio** although perhaps I would like just slightly more audio emphasis on the high end. If this is a problem, it is a correctable one with only minor parts changes at the factory. The fact that our receiver traveled from Montreal to

Washington, performed at the SPTS show, then traveled as baggage on Eastern Airlines to Fort Lauderdale, and, finally traveled to the islands as air freight on a DC-6 where there is no regard for 'fragile labels'...**and still performed** so well sets my mind at ease about the ability of the unit to take rough handling. **I recommend the 692A as a fine running receiver** and believe Daniel and Chris have a bright future ahead of them. Now if they can just get their clock technology up to speed with their TVRO receiver technology...

CommPlus is located at **3680 Cote Vertu, Montreal, Canada**. Their telephone number is **(514) 337-7255**.

CAN YOU SEE 1/5TH OF A SECOND?

During the recent (March 1981) CNN coverage of the attempt on the life of President Reagan the transponder 14 Cable News Network became one of the primary 'news

sources' for this news story. Through their news team in Washington CNN did an excellent job of covering the developing story as it unfolded.

The first announcement of the event came on CNN. It was nearly one hour after the event took place that we noticed the first 'news bulletin' on Chicago's WGN, for example. Some three hours after it began WGN decided to pay some attention to the story and having apparently made arrangements with CNN they began taking the CNN feed from FI transponder 14 and rebroadcasting it as their own coverage of the event. This involved the CNN signal going from Atlanta to FI and back again (approximately 1/5th second elapsed time for the trip to the bird and back) where it was received at the WGN terminal. Then WGN pumped the signal back through its own terrestrial channel 9 transmitter in Chicago where United Video took the WGN signal 'off the air' and carried it via microwave out to Lake Geneva, Wisconsin for the trip back to the bird via FI transponder 3.

Anyone watching the coverage from **both** had to notice that the CNN pictures and audio were ahead (in time) of the WGN coverage. We then sat down to try to nail that 'delay' in still film. The trick was to find a scene when there was some

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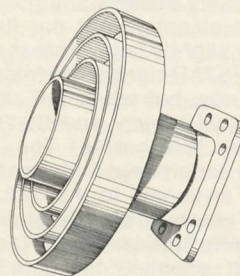
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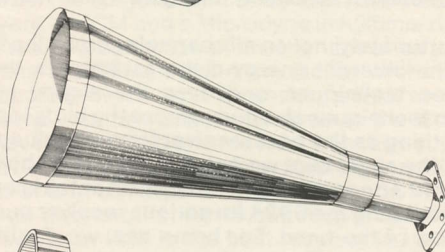


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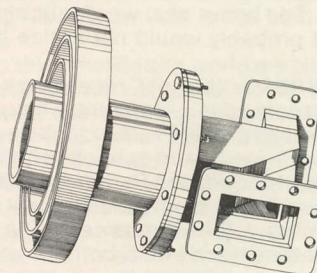
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Super Feed



Super Spherical



Dual Feed

action; action that would clearly show that the double hop (twice to the satellite and back) was in fact introducing extra time delay into the WGN signal. However, since we were already seeing the **first 1/5th** of a second on the CNN primary signal we were actually looking for only that **single fifth of a second** or so that represented the **extra delay** caused by the WGN second 'hop'. We shot perhaps twenty pictures and were lucky to get a couple that clearly displayed this 'warping of time' via the satellite.

The left hand monitor is CNN through the bird on **transponder 14**. The right hand monitor is the same CNN signal after it went through the bird **a second time on WGN**. Notice the hand on the right hand portion of the screen; 1/5th of a second before the left hand screen had the hand in the same position.

The next time somebody tells you that satellite coverage is 'live' and 'happening right now' you can tell them that strictly speaking that is not true. In the best case you are 1/5th of a second behind the real event and if there is a double hop



1/5th of second delayed; WGN on right hand monitor screen.

involved you are more than 2/5ths of a second behind. It is probably still close enough to set your wrist watch however!

TECHNICAL CORRESPONDENCE AND NOTES

SINGLE CONVERSION

I read your May issue with interest, particularly the VCO/Single Conversion receiver report. The article was an excellent followup to Taylor Howard's lecture at the Washington SPTS. I too have observed the proliferation of single-conversion, image-reject-mixer receivers with alarm. My concern like yours, is the eventual difficulties these 'low-cost' schemes will create for this industry as we begin to recognize the 'signal pollution' problems we may be creating. FCC regulations could make segments of our industry obsolete overnight.

Image problems cannot be economically or reliably filtered away, nor can 'leaky designs' (that allow radiation of 'free-running' VCO in-band signals) be readily 'sealed' against leaks. You can't sufficiently reduce radiation without expensive enclosures (plastic enclosures will not do!) and you can't reduce in-band leakage without the use of expensive isolators. Tying together several leaky image-reject-mixer receivers on the same antenna would be disastrous without the use of expensive 'clean-up' techniques. Free running VCO designs are archaic. Frequency synthesized oscillators are not that expensive. Have we forgotten so quickly what happened to the CB radio industry?

The 'good arguments for double conversion' you refer to in the May CSD are **not** on that "relatively high" an "engineering plane". We both know that "...reproduction of...satellite uplink baseband information..." (as you call it) is precisely what receivers are for, the **baseband** is the Video and Audio signals you are trying to watch and hear on your TV receiver.

Images can be **eliminated** rather than reduced, using dual conversion systems. Single conversion system LO leakage can be eliminated rather than reduced, either by using ferrite isolators or by picking an IF frequency high enough that the

LO doesn't fall 'in-band'. All of these features, together with stable crystal controlled, synthesized tuning can be found in receivers designed for the home market at an affordable price.

I anticipate you will be receiving a lot of mail on the subject of dual-conversion vs. image-reject systems. Perhaps my knowledge of the way the "pro's" do it (by buying down converters for dual conversion systems) gives me a unique vantage point. As more and more earth stations are built (and more and more multi-receiver systems are installed), the LO leakage problem will continue to rear its ugly head. We will either have to set our own industry standards or invite legislative or regulatory (re) action. I look forward to further news on this subject and the comments of other CSD readers. See you in Omaha!

Alan Egger
Sales Manager
Merrimac Industries, Inc.
West Caldwell, NJ 07006

We too anticipated considerable mail on this subject. Your's was the only intelligent letter we received! We did lose approximately 3 pages of advertising in our June issue because some receiver suppliers didn't agree with our May report, but we had anticipated that kind of reaction before we published the report. For those who didn't know and therefore could not have forgotten, the CB radio industry along about 1977 or so got its transceivers into a wringer because they were found to have undue radiation (because of frequency synthesizer schemes) in the 30-40 MHz region. The FCC jumped on the CB folks with both feet and this regulatory reaction shut down several large suppliers overnight. It also threw the marketing of CBs into chaos and postponed the switch from 23 to 40 CB channels. After more than a year of messing around the CB industry had dropped from around 18,000,000 unit sales a year to well under 10,000,000. We'd hate to see our own infant market drop by 45% in a year. It could happen here just as easily. If single conversion is here to stay, at least (as Alan Egger suggests) move the IF off of 70 MHz and up high enough (i.e. above 500 MHz) to avoid in-band interference. Impossible you say? When you look at the likely prospect of FCC intervention, we don't think it is so impossible after all.

ANTENNA TEMPERATURES - AGAIN

In response to Norman Scheinberg's letter on page T16 for May 1981. Earth noise or noise emitted by objects around an antenna is generated by anything and everything that is neither a perfect conductor nor a perfect insulator. In other words, anything that appears as a lossy medium to micro-

The ICM TV-4400 Satellite Television Receiver System

- New Design
- Improved Selectivity
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- Built-in D.C. Block

The ICM TV-4400 offers advanced receiving techniques that improves satellite TV reception. The "system" consists of two units. The smaller of the two is the RF downconverter which is enclosed in a environmental protective box (3" x 4" x 7"). The double conversion RF downconverter is intended to be mounted at the antenna site as close as possible to the LNA. The advantage . . . cable losses at the high frequency are negligible.

The baseband receiver unit (3½" x 8" x 8") has 6.2 or 6.8 MHz audio selector switch, channel step tuning selector, fine tuning, power switch, all on front panel.

Features include: Automatic frequency control, automatic gain control, standard video output, subcarrier output for future accessories, wideband phase lock loop demodulator, internal selectable video polarity, internal audio and video controls, provisions for RF modulator. Receiver is equipped with a standard jack for optional remote control.

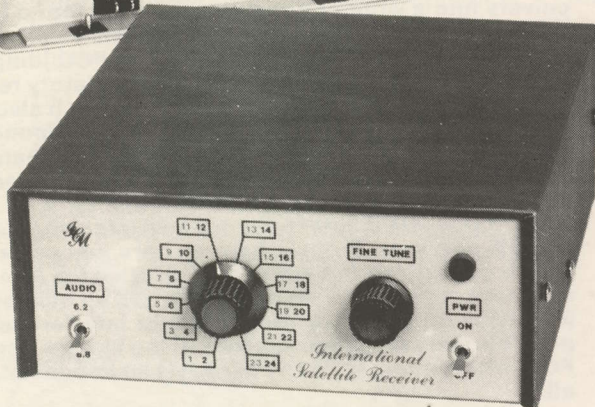
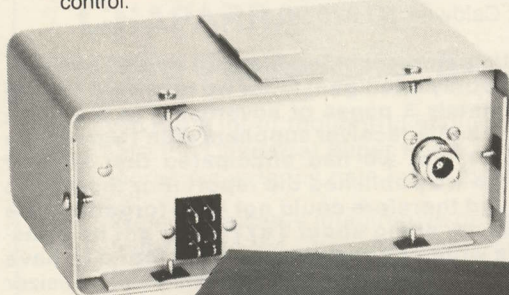
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waves. Such objects will only contribute substantial amounts of noise however when their dimensions are significant in terms of the microwave energy you are dealing with.

In the case of the reflector surface itself, RF currents induced by the incoming microwave energy flow only to skin depth, which in the case of aluminum, is less than 1.3 microns (1.3 x 10 meter). In practice this is likely to be somewhat deeper than the theory due to the thin layer of oxide that always forms on the aluminum surface. The 'lossy medium' of the aluminum surface therefore represents a very tiny percentage of a wavelength and as such, even at the elevated thermal temperatures of a sunny day, will not contribute detectable levels of noise temperature to the antenna.

The case of paint is slightly different since the incoming energy must flow through the layer twice; once on the way toward the reflecting surface and then again after being reflected. The paint would be many times thicker than the skin depth but even so it still only represents a small fraction of a wavelength at 4 GHz (If we assume a paint thickness of five thousandths of an inch. This would be 0.010/3.0 or approximately 0.003 of a wavelength at 4 GHz.)

Noise contribution due to paint would be insignificant regardless of the type used. The prime consideration here is to choose paint that will minimize sunlight focusing (flat finish, not glossy) and minimize infrared absorption by the reflector surface. The heating effects of infrared can create mechanical stresses which could distort the parabolic surface and reduce aperture efficiency. Flat white from Sears, as suggested by Coop, is likely to be as good as any.

Prime contributors to the antenna noise temperature as seen by the LNA input are (1) objects (lossy mediums) surrounding the antenna which can be 'seen' by the feed horn over the edge of the reflector, and, (2) these same objects as they are 'seen' by the sidelobes of the feed/reflector combination. The summation of all of these components should typically run in the 20 to 35 degree Kelvin range for a properly operating focal point fed reflector system.

Finally Mr. Scheinberg asks about using a shroud and microwave absorbing material. **Do not, under any circumstances, use microwave absorbing material for this purpose** since it is a lossy medium by design. As such it is an excellent source of excess noise because of its uniformity and match to free space. Placing it anywhere in the field of view of the feedhorn is not recommended.

Jack Trollman
3448 Chruin Drive
Mountain View, CA 94040

Jack, a "Pioneer" in this field, knows of what he writes. We trust this will be the 'last word' on this subject until the next crop of new entrants into the field comes along asking the same questions. Thanks Jack.

HAPPY ABOUT OMAHA

I was really happy to hear that the next SPTS will be held in Omaha. This is an opportunity for me in several ways. We are scheduled around 1 June to announce a 12 foot aluminum dish antenna with petal type construction and a polar mount for about \$1500. I completed beamwidth measurements recently and found the 3 dB points to be 1.4 degrees wide point to point. The G/T measurements are next. Look forward to seeing everyone in Omaha.

Will Jensby
Davenport, NE 68335

A 12 foot dish is a good size for virtually any portion of the United States and Canada. With the new birds coming up over the next three years, having a polar mount that tracks well, and can be motorized is of course an absolute requirement.

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LNAs AND ACCESSORIES

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OUR PLEASURE

It was a great pleasure having Coop participate in the NEDA Management Conference at EDS '81 in Atlanta. His contribution to the program was immense and much appreciated. The quality of the seminars was the best ever and Coop had a large part in making that the case. I and the entire Board of Directors of NEDA wish to extend our thanks for the time and effort Coop put in to produce the excellent presentation.

J. T. Mack
 Executive VP
 National Electronic Distributors Association

It is always a pleasure to 'turn on' a new group of people to the excitement and business opportunities of private satellite terminals. It is also educational for us to see how others 'run their shows'. We'll do it again.

TECHNICAL NEWS NOTES

NATIONAL Microtech has introduced a new concept in home TVRO antennas, the 'Apollo X-9'. The antenna utilizes a single piece of fiberglass shaped like an octagon. They claim this reduces the size of the antenna required while maximizing performance.

Dealer price including polar mount and remote LNA (polarization) rotor is \$1395; an optional model X-1 remote antenna (satellite to satellite) positioning system is available for \$495. NM expects to be shipping 2,000 of these antennas per month by the end of the first quarter of 1982.

AFTER years of indecision it appears an ARABSAT satellite system may be going up after all. Plans are to announce soon a 3 satellite system, using C and S bands, with a total of 25 channels (each). Groups to participate include Saudi Arabia, Kuwait, UAE, Iraq, and Libya. Earliest launch dates would appear to be late in 1984.

EARLIEST scheduled launch date for Hughes Communications GALAXY TWO bird is September of 1983. Bird is not likely to be dedicated to video as present plans for GALAXY ONE now point. See comprehensive report on video birds this issue.

SEPTEMBER is likely date for second flight of Columbia shuttle with 30th present target date. This will be another test flight with no satellite launches planned.

1982 is now scheduled completion date for Argentina's "Project Sovereignty"; the national television and radio link-up via INTELSAT leased 1.5 transponders providing full transponder Argentine (Spanish language) television to virtually all of South America. More than half of the terminals are scheduled to be installed this year and shipment of six meter receive terminals has already begun at Harris Corporation. This suggests initial tests of INTELSAT feed could begin as early as August or September.

AFTER 18 months of rumors **HEATH** is taking step into home satellite field. Action comes after decision to purchase from **Scientific Atlanta** TVRO receiver, antenna, LNA pack-

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age. Package will be reconfigured by HEATH utilizing parent **ZENITH** "Space Command" receiver and be sold through the more than 60 HEATH stores nationwide. It won't be cheap.

NIGHTLY Spanish language newscast now being originated in Washington for SIN, transmitted via WESTAR I, TR 5, to San Antonio KWEX where it is re-transmitted back to SIN affiliates on WESTAR III (TR 8).

EUROPEAN tests utilizing 12 GHz (Ku band) OTS satellite now feeding French language television programs throughout much of Europe and parts of North Africa.

VEU service (WESTAR I, TR 5) should be gone by the time you read this. Firm was feeding nightly movie schedule from Oklahoma City to only Dallas affiliate after VEU (Gene Autry) pay TV network developed problems. Substitute service called '**SelecTV**' should pick up where VEU left off, feeding Tulsa, Ann Arbor and other additional sites with essentially same type of programming.

TPN (The Pop Network) latest to announce comprehensive schedule of live and taped music programs for distribution via satellite. System plans to use as much as 100 hours per month (just over 3 hours per day) to feed service and has ambitious plans to grow to four full time transponders. No satellite selected yet.

ANOTHER pop/rock producer, Global Satellite Network, began in May feeding stereo audio of live concerts to selected FM stations nationwide on WESTAR I. GSN now plans live video concerts as well and may spring first show July 4th or 5th with the 'Beach Boys'.

IN FCC filings studied to date there is general three-pronged theme from those who object to FCC approving 12 GHz DBS service: (1) The 'danger' presented to local over the air 'free TV' by DBS, (2) If multiple groups are allowed to operate DBS, what will be done to assure that the technical standards are compatible between each so the customer is not faced with deciding which receive terminals to purchase, and, (3) What happens to the existing 'terrestrial microwave' users in the 12.2 to 12.7 GHz band?

PRESENT OTS satellite, now operating in 12 GHz band as a test for Europe, will be joined by first regular operational satellite (ECS-1) in mid 1982. Whole concept of direct broadcasting (using Ku band) to all or most of European homes now catching fire in Europe where recognition is slowly sinking in that satellites are more than a curiosity.

SOME of the mystery surrounding how Westinghouse will utilize the ten WESTAR transponders it has on order may be resolved soon. "Early 1982 start" is forecast (at same time as WESTAR IV becomes operational) for Westinghouse entertainment and educational programs on first five channels.

MIAMI, long 'gateway to south' will join U.S. uplink network on SATCOM in October when RCA places a pair of 13 meter antennas in operation. Presently, Miami is served by downlinks only, and uplink traffic must travel over terrestrial lines to Atlanta area before heading for bird. One of first customers for new terminal will be MCI Communications which has leased equivalent of 2,000 voice grade channels to go into and out of Miami area.

FORMAL dates have been announced by RCA for launches of SATCOM F3R and F4. 3R is now scheduled to go up around 16th of October while F4 will go on December 3rd. Scheduled 3R launch in June fizzled when problems developed with portion of bird that separates during geostationary orbit injection phase of flight. If these schedules hold earliest dates for F3R service would be mid-January and F4 would be late February.

ROBERT WOLD has joined NBC, CBS and ABC in requesting from COMSTAR transponders for use in planned March 1982 start of experimental 'Satellite Television Service'. STS is Bell's plan to move network TV linkups to affiliates to satellite as 'backup' to terrestrial links. Wold's decision to acquire use of two transponders points up his firm's plans to provide 'alternate programming' directly to network affiliates (see report this issue of **CSD**). STS project will radically alter

way COMSTAR birds are now used, with multiple feeds for each network virtually around the clock. COMSTAR 4 is seen as most likely bird for service if it gets off the ground.

CBN (TR 8, FI) is now in the radio network business utilizing subcarriers on FI. Using subcarriers on 5.58 and 5.76 (stereo) service programs 'adult contemporary music' format for eastern time zone; utilizing subs on 5.94/6.12 CBN programs same format for central time zone; utilizing subs on 6.30/6.48 same format for pacific time zone. On 7.56 service programs monoaural news service. Decoders are available from Wegener Communications at (408)448-7288. CBN has full data on service availability at (804)393-2501.

NELSON ETHIER (4209 Saint-Christophe, Montreal, P.Q. H2J 2Y8; (514)527-4959) now available for consulting in antenna, feedhorn and mount design as well as wide variety of other areas involving private and commercial terminals.

ARGUMENTS over whether 3 meter dishes will function properly with 3 degree satellite spacings continue. Latest to conduct 'study' was Walter Braun for RCA Americom. His bottom line; as long as alternate satellites at 3 degree spacings are cross polarized, no problems. If birds share same polarity, some degradation in service.

NASA announced total number of Space Shuttle flights between now and 1985 to be cutback from 48 to 35. Worried would-be satellite operators are concerned how cut-backs will impact on planned new birds.

ARABSAT space program awarded contract to consortium made up of French group and Hughes. Three birds will be in orbit, have 25 transponders in C band but primary TV will be in 'S' band (2.6 GHz) for community TV installations.

SHOWTIME will have begun 24 hour per day service (transponder 10, 12) by the time you read this. **HBO** announces they will go to 24 hour per day service 1 January 1982.

ANIK 1 now officially 'dead'; ran out of maneuvering fuel. A2 and A3 continue to be co-located at 114 degrees west but A2 portion has only 4 serviceable transponders operational. ANIK C, a Ku band (only) bird is due for launch mid fall 1982; ANIK D, a 24 transponder C band bird to replace ANIK A2/3, will launch August 1982 and be operational by mid-fall 1982.

RUMORS that INTELSAT will shift to west, one of present Atlantic birds, so as to be able to provide leased service to Mexico and other countries in central and South America; persist. Likely moving date in mid 1982.

ONE THIRD of the 18 transponders offered for sale by Hughes for its GALAXY ONE satellite (see story this issue) bought at one time by HBO parent Time, Inc. No details on how Time plans to use the new set of six transponder; Galaxy will activate May 1983.

IF YOU think you have seen 'everything' there is to see on satellite TV, hold on. PENTHOUSE magazine ready for fall launch of new sex oriented network called 'Penthouse Entertainment Television' (PET). Programming will be on transponder 3, WESTAR 1, run from 8 PM eastern onward. Service promoted for 'people over 25 years of age'; they claim '...TV will never be the same...'

TWO CHINESE geostationary experimental communication satellites now scheduled for launch this year; one to be at 125° east and the other at 70° east. Birds are numbered STW-1 and STW-2, are lightweight in approximate class of junior-grade 12 channel WESTAR.

TOTALLY revolutionary approach to private satellite terminal electronics likely to have first public display SPTS 81 Omaha. Package uses single LNA, typically 10 foot antenna, tunes in both vertical and horizontal transponders in numerical sequence or can tune in both at same time with two or more receivers hooked to innovative electronics package. Part of system excitement is due to the potential to hook up hundreds or thousands of **separate** receiver locations to **single** antenna and grant to each viewing location completely **independent access** to any of the transponders on the bird. Details in **CSD** for August.

SATELLITE OPERATIONS PARABOLIC ANTENNAS SATELLITE NAVIGATION

SATELLITE OPERATIONS MANUAL by Bob Cooper reveals innermost secrets of satellite operations, who uses them, how and where. ALSO extensive coverage of simple tricks to improve reception, troubleshoot terminals, maintain high performance, locate special services.

NELSON PARABOLIC MANUAL by Nelson Ethier describes theory behind and step by step construction of 10 and 12 foot fiber/metal sandwich high performance TVRO antennas. Literally a manual to start an antenna business in your garage! Includes complete mount, feed instructions.

GIBSON SATELLITE NAVIGATOR - superb treatment of antenna mounts, tracking systems, full understanding of how complex world of geostationary orbit belt can be reduced to simple layman terms. No satellite buff should venture through the skies without it!

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SATELLITE BUSINESS MANUAL by Coop provides full business game plan for selling, installing private satellite terminals as a business venture. Includes comprehensive look at most of the equipment now on the market, discusses dealer/supplier relationships.

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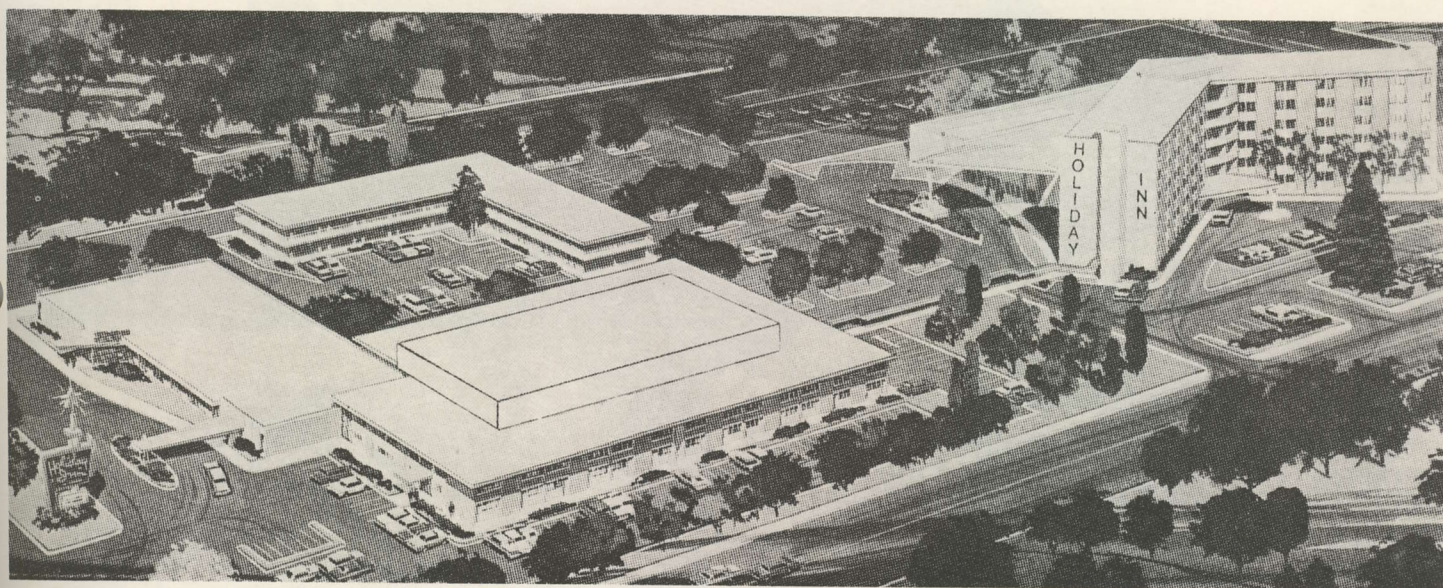
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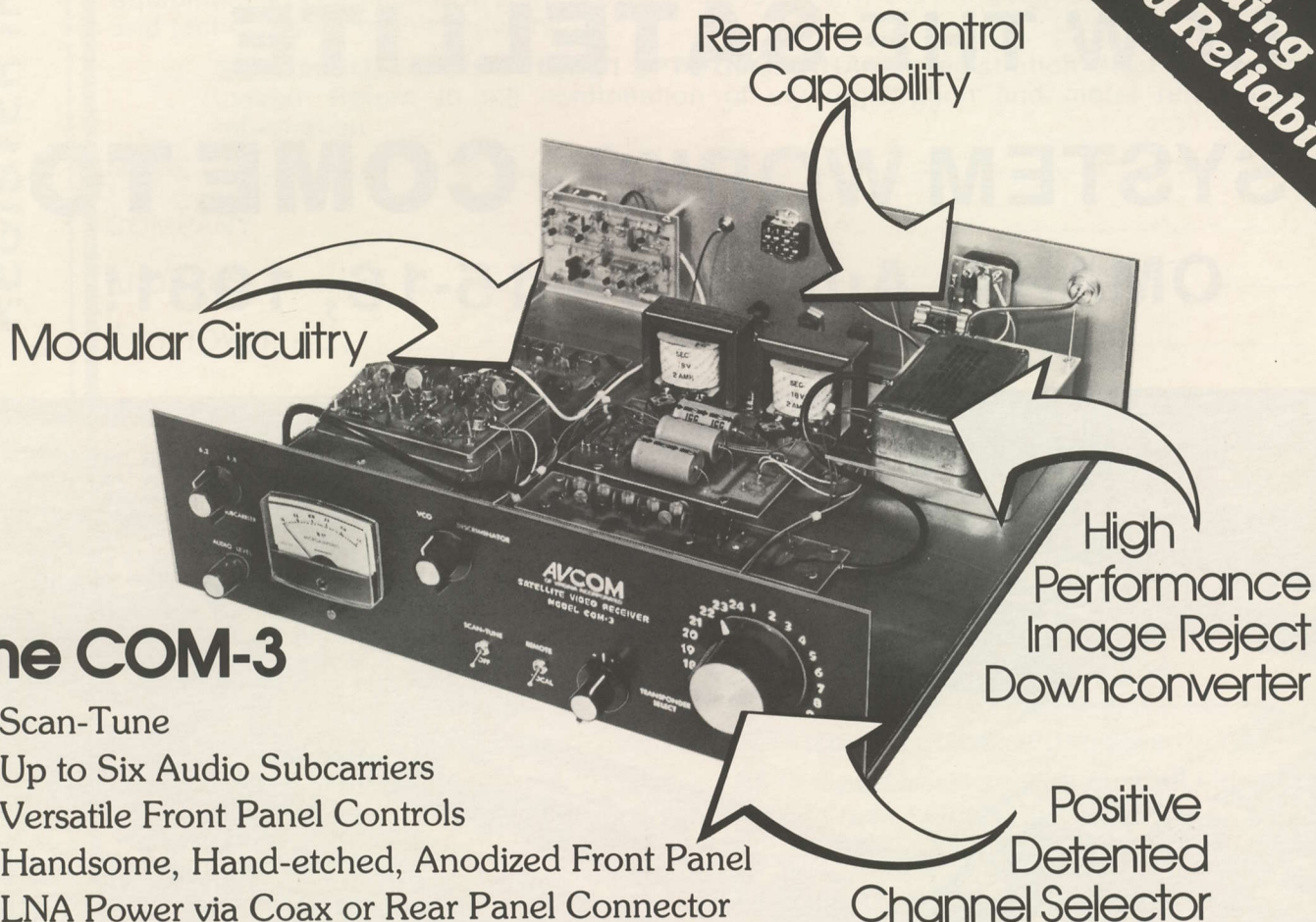
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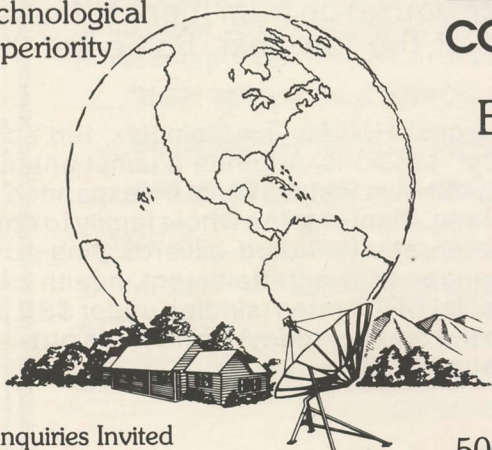


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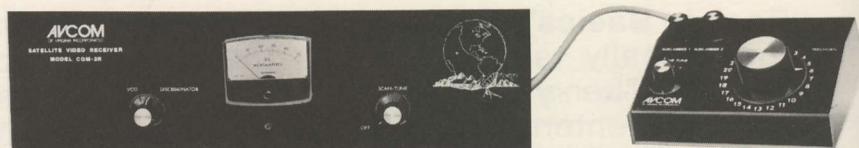
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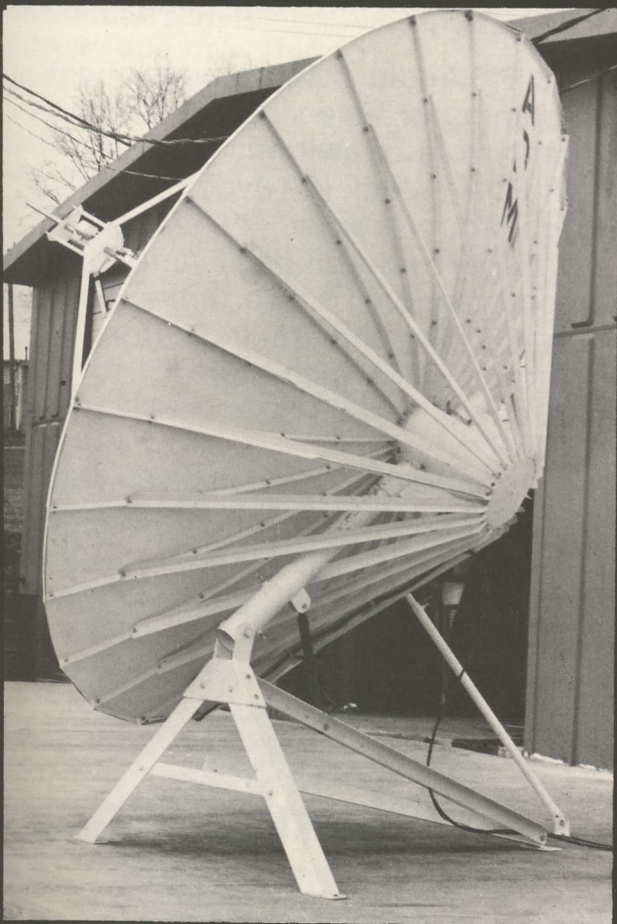
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PRICE: Less than half the cost of other antennas.

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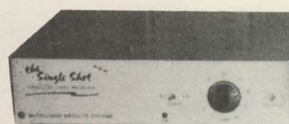
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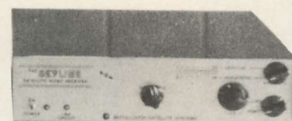
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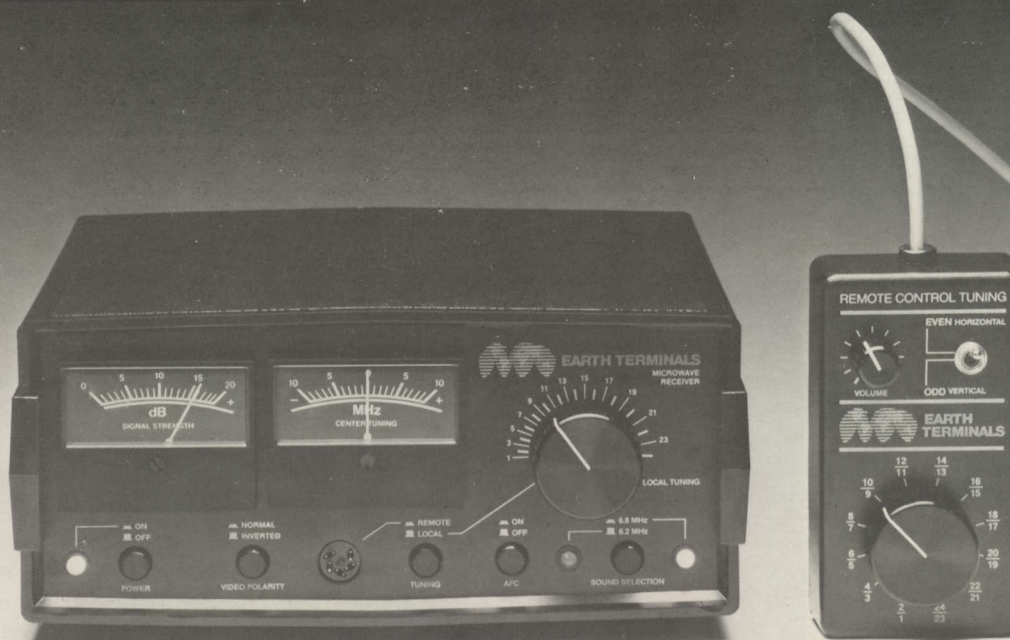
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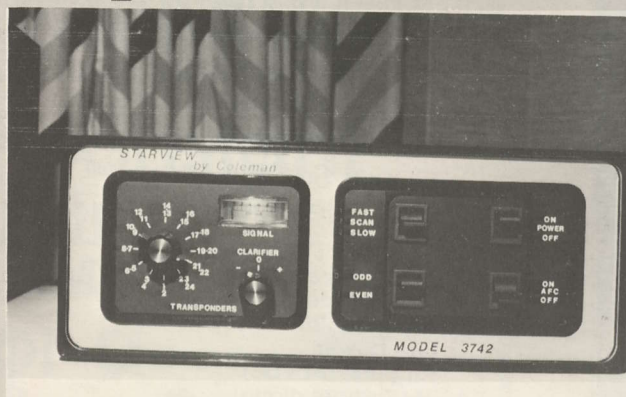


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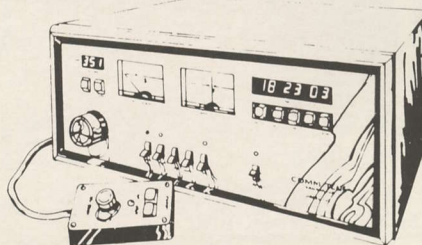
National Satellite Systems is one of the fastest growing distributors of TVRO Systems. Since 1978 we have placed no minimums on orders, no pressure sales, no conflicting dealer territories, we simply offer you excellent TVRO equipment at low prices to compete in the TVRO market. In most cases, delivery is from stock. Our staff at National Satellite Systems has over 82 total years of microwave experience. Also, we can be reached on the weekends for your convenience. We are constantly researching new products for our dealers. Make your dealer application today, it's easy!

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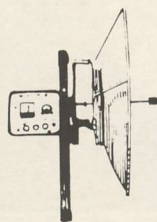
Amplicia - Avantek - MA / Canada

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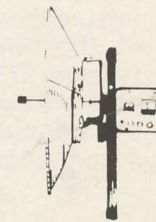
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VTO-8060	600-1000 MHz	1 to 50 V	10mW min
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VTO-8150	1500-2500 MHz	1 to 60 V	10mW min
VTO-8240	2400-3700 MHz	1 to 40 V	10mW min
VTO-0476	2600-3100 MHz	1 to 15 V	10mW min
S080-1564	2800-3400 MHz	1 to 15 V	10mW min
TVO-8370	3600-4200 MHz	1 to 15 V	10mW min
VTO-8360	3600-4300 MHz	1 to 30 V	10mW min

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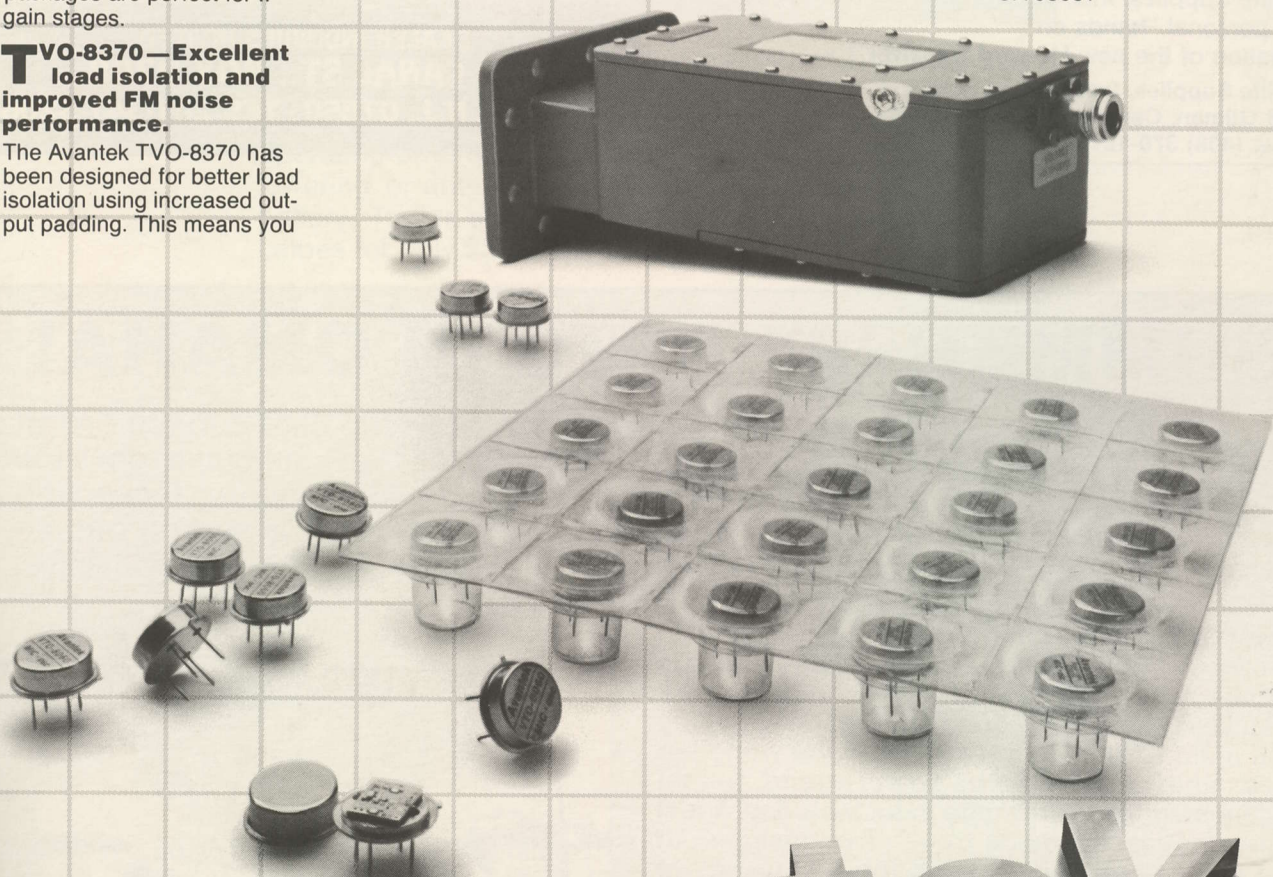
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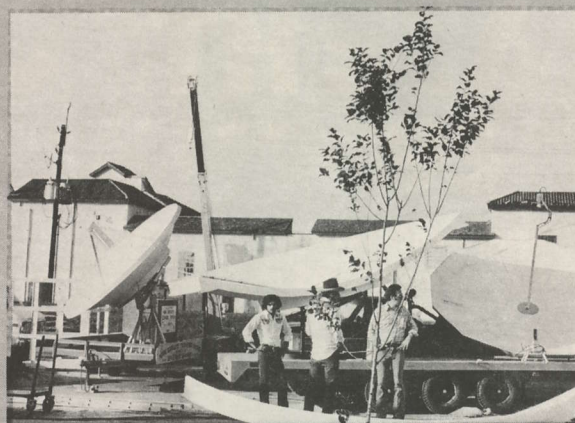
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Some say the basics of this industry are being lost to the slick promotions of hardware and services. **They may be right.** Some say it is very difficult to get a full understanding of how the satellite to earth system works anymore; those who know tend to keep it bottled up. **They may be right.** So STT is setting out, on purpose, to change all of that. **In Omaha in August.**

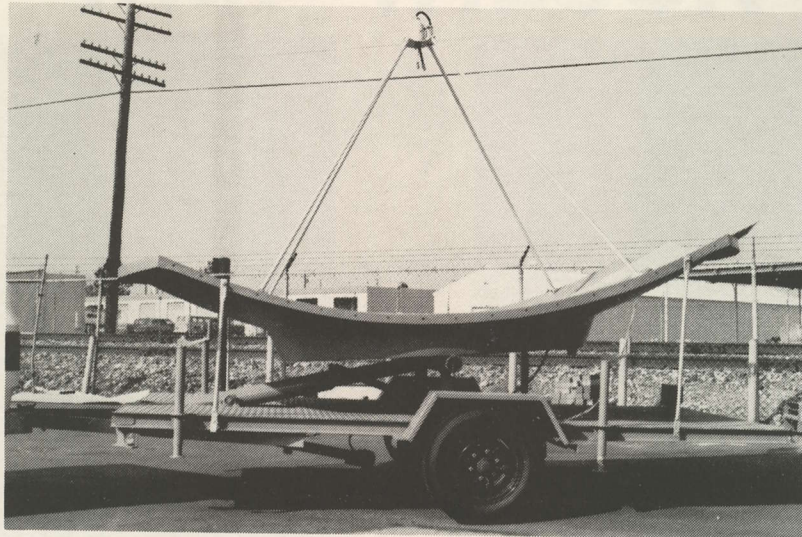
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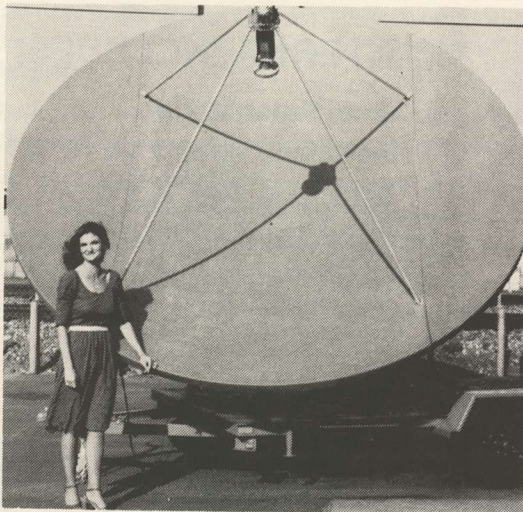


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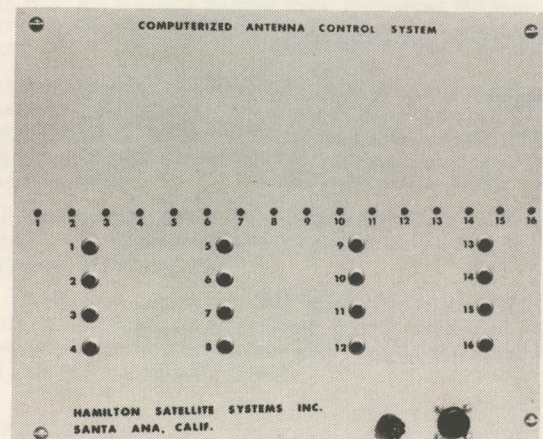
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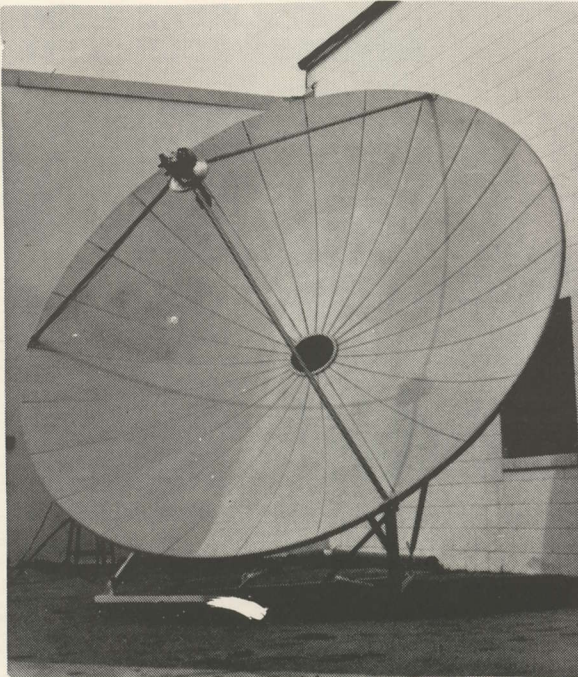


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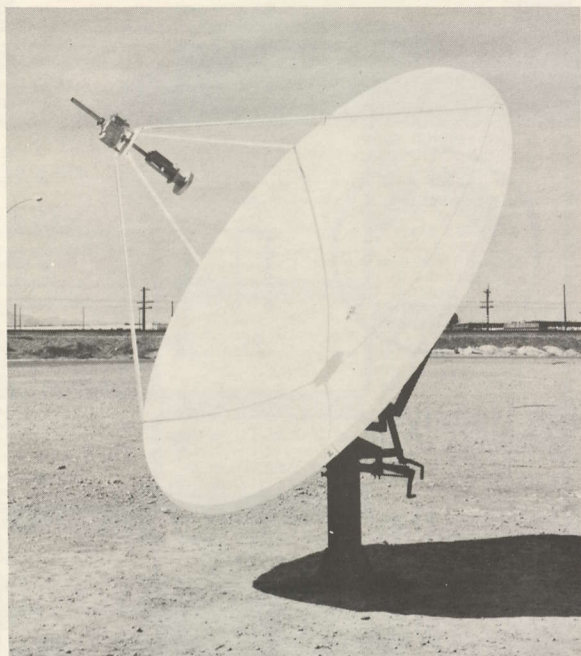
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The 4pc construction of the dish provides easier handling, less installation time, and greatly reduced shipping costs.

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The Wilson antenna package includes antenna, Vari-Mount, manual satellite locators, LNA/Rotor mount, rotor, 100' of 4/C rotor cable, and a rectangular feed horn.

Wilson's unique "Vari-Mount" provides the easiest installation and mounting method available today. Simply dig 4 holes with either a post-hole digger or an auger, 4 feet deep. Form a base with 2 x 4's for a finished look, then insert the four furnished bolts. Fill with 12-14 bags of Redi-Mix and it is finished.

With the exclusive 4 point Williams' mount, you are assured a quicker installation and that the antenna will be more securely fastened to the Vari-Mount. The antenna struts aid in stabilizing the fiberglass for operational reception in winds of up to 50-60 MPH.

A ball bearing race allows easy turning of the antenna in changing to the different satellites. A scale is included on the base to assist in their location.

The Vari-Mount comes standard with manual satellite locators in the form of gear driven hand cranks. Easily turned, they offer the most economically accurate method of rapidly moving to a different satellite.

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The new Wilson Scalar Feed Horn offers an additional improvement to signal reception (.5 to 1.5DB) that will be immediately visible. Available as an option to both 3.35 and 4.0 meter antennas.

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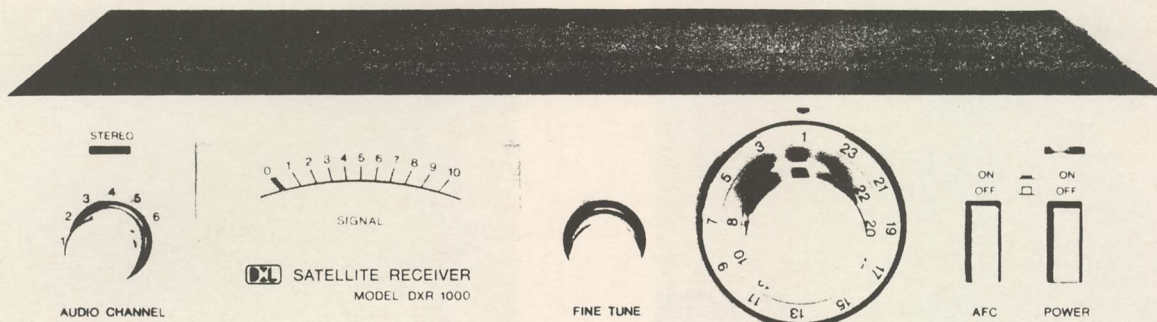
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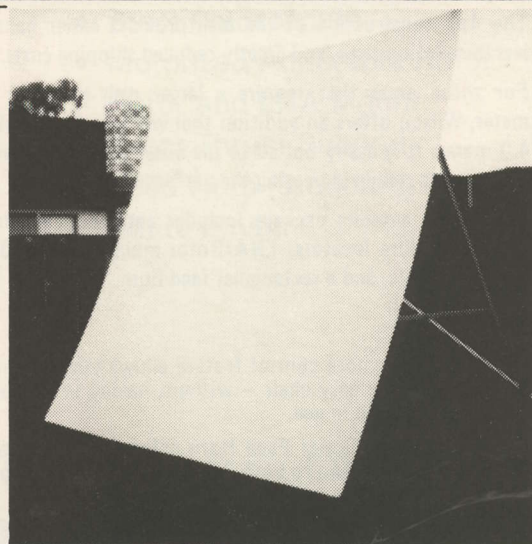
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MHz fully independent
Video level out: std. 1 volt p-p
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Demodulator: NE564 PLL IC
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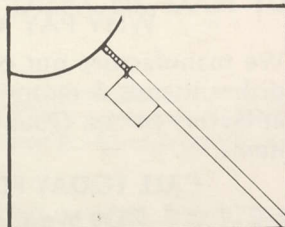
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COOP'S COMMENT ON PROGRAMMING

AT THE FCC...

One of the chief worries of those who track the political scene at the FCC and in Congress is that some agency or legislator will come along and make an official sounding pronouncement regarding private terminals; an announcement that will be intended to 'clarify' private terminals but which in fact will only confuse matters more.

When the FCC, acting on their own initiative, did in October of 1979 eliminate the mandatory TVRO licensing requirement many feared theft of privately owned services would proliferate. Some felt that as long as TVRO terminals were **supposed** to be licensed, the mere general knowledge that such a license was required would serve as a brake on the unfettered growth of private terminals. The theory was that people who might otherwise buy a private terminal would delay their purchase as long as there was 'confusion' or 'uncertainty' concerning the legal status of their use.

The Commission decided contrary however, determining that Section 605 was one of three 'strong, remaining tools' for enforcement of Commission goals. And without the mandatory licensing the industry has grown rapidly.

The unresolved 'theft of program service problem' is a **problem**. Here we have an industry trade association, representing most of the major manufacturers, many dealers and distributors and some users dedicated to the premise that the private terminal users are willing to pay for their service(s). And on the opposite side of the fence we have the program service suppliers who largely refuse to sell those services. In between we have confusion. The trade association keeps beating on doors asking people to take user money for services viewed. The doors remain closed. And the tension keeps building.

Through all of this some well meaning soul is going to sound off with an 'official statement' that he hopes will relieve the tension and create more time for both sides to reach an agreement they can live with. I suspect that statement may be

coming soon, and it may come from someone at the FCC.

The Commission probably feels a little guilty about simply removing licensing back in 1979 and then stepping back from the issue. The staff charged with creating the 1979 rule change did in fact promise, at the October 18 (1979) hearings, that it would address the issue of 'theft of service' and be back at the Commission with a 'clarifying rule making proposal'. It said it would do so 'quickly' and two of the Commissioners who voted at the time for lifting licensing did so with the understanding that theft of service would be addressed 'shortly'. I have a videotape of that 1979 proceeding and every now and again I play it through to refresh my memory of the event.

There are several staff level people in the Commission who see what is happening and who apparently feel it is their duty to set the record straight. They are now searching around for the right opportunity to make a 'statement' of clarification. Microdyne may have handed them that opportunity this spring. Microdyne, for reasons they best understand, sent to the Commission's Maryland laboratory a complete TVRO. They asked the FCC to 'bless' it with a **type acceptance**. The Maryland Lab didn't know what to do with the terminal. There is nothing in the rules requiring type acceptance for TVRO terminals. However, a member of the FCC's General Counsel's office saw an opportunity here and on a second look the Lab discovered that the Microdyne terminal has an 'in board' modulator. Under FCC rules nobody may sell a 'Class 1 TV Device' without type acceptance. A modulator is such a device. The Microdyne modulator **apparently** would not pass muster.

Seizing on this opportunity the GC's office has been working on a statement that takes Microdyne (and the industry as a whole) to 'task' for offering for public sale "a device or system capable of receiving private transmissions protected by Section 605..." In effect, the GC's office wants to use the Microdyne submitted terminal as a 'reason' to jump into the marketplace with a strong statement about theft.

Numerous parties, some government, some private, would welcome such a statement. It would be printed and re-printed nationwide with the speed of light. Television newscasts would mention it. Newspapers would print it. And the public, the same public you want to interest in owning their own TVROs, would be confused by it all. Many would listen to **your** explanation of 'free to view' and 'not free to view' transponders and then decide it was too big a risk to plunk down big dollars for a system that was so clouded in legal problems. Your banker might read about it in the Wall Street Journal, and your line of credit could dry up. The impact of such a statement would be very sweeping.

All of which says that the urgent need for positive, definitive legislation in Congress mandating to private terminal operators their rights should have total support at this time. The industry needs something to hang its hat on. A law stating that certain services (such as C-SPAN) are available for free national use by private terminals would be a peg for the hat. It would not be the final answer but it would be a start.

C
S
D
PROGRAMMING



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THE SHAPE OF BIRDS TO COME

A TANGLED WEB

Each year for the past four or so years the annual gathering of the nation's cable television system owners and operators has brought forth a new gusher of potential satellite program services. This year's annual meeting, held in Los Angeles at the end of May, was no different. It was in fact the largest single 'mass announcement' of new services ever assembled into a single three day period.

Without the new announcements, the array of programming services being offered up via satellite to cable TV and other distributors is bewildering. With the new announcements, it becomes almost impossible to find a single logical starting and ending place to the constantly changing scenario that is unfolding. It is like a huge bowl of jello; you push in at one spot and the jello pops out at two or more new locations.

Several years ago when HBO pioneered satellite premium program delivery there were few who felt the service would be more than a curiosity. When Ted Turner's WTCG (now WTBS) joined HBO and then CBN joined the first two it became apparent that perhaps there was going to be a satellite antenna system in **many** cable system futures. Today the question is no longer relevant; what remains is the bigger question of where will all of these present and proposed satellite services 'fit', and **how many satellite antennas** per cable system headend will be required to access for local cable view the huge selection of programming services piling up?

The first HBO programming was transmitted on a single vertical transponder (17) on SATCOM F2. The cable industry used the F2 bird until June 1, 1978. RCA early on had indicated that it would be 'moving' the then existing cable programmers off of F2 to F1 when the number of services on F2 reached a 'critical mass'. In this case the 'mass' amounted to around 8 services or so. The reason for the move was simply that RCA was (and still is) utilizing the F2 bird for dedicated communications into and out of Alaska and this prior commitment eats up around a dozen F2 transponders during the peak Alaskan traffic hours. When it became clear that cable was going to require more transponders than F2 could provide, cable had to move. F1, largely used for broadcast industry feeds and other occasional users to that point, became the new cable 'home' on June 1, 1978.

Because so few people in the business (cable or satellite) really recognized the potential for cable programming via satellite, there was only minimum excitement generated by cable's first (HBO) entry to satellite. At the time there were two viable US satellite operators; Western Union with WESTAR I and 2 operational, and RCA with SATCOM I and 2. Western Union, then as now, had only 12 operating channels to work with per bird or a total of 24. RCA, with the pioneering of dual polarization (vertical and horizontal) had twice as many transponders to lease. RCA was more interested in the cable business than Western Union and the early bonds between

cable and RCA have held up pretty well since that time. But it has not been a perfect marriage. At one point late in 1977 and early in 1978 HBO threatened RCA with moving; to WESTAR. The general theory of the day was that "...where HBO goes, so go the others". This was due to the fact that more than 80% of the cable systems of that era using TVROs were also HBO affiliates, and services such as CBN and WTCG and PTL (et al) got started rapidly because the dish antennas and LNAs were already in place (receiving HBO) when they got started. The cable operator, to add the newer services, only needed to add an additional receiver for the new service. **If HBO left RCA and moved to WESTAR**, the dish antennas would be moved to WESTAR and that would leave the services remaining on SATCOM with very few cable customers; unless they could convince the cable industry to add a second dish. At that point in time, when the **majority** of the cable systems did not have a **first** dish, adding a second dish was not a mature thought.

HBO and RCA patched up their differences and as was reported in the trade press of that era, HBO gained certain concessions from RCA. The details of what HBO got, from RCA, have never been disclosed but even today one sees on-going threads of that agreement cropping up from time to time. We will look at that in this report since it will have a direct bearing on private terminals today.

It was in the summer of 1980 that the first cable programmer of substance 'jumped ship' from RCA. SPN (Satellite Program Network) had been an early programmer on SATCOM F1. It began as a three hour per day service early in 1979 and by mid-summer of 1980 it was pushing a 24 hour telecasting day. SPN is owned by the same general people who own the common carrier company that brings WTBS to you on transponder 6. In a sense, the cash flow success of WTBS made it possible for a chap named Ed Taylor to launch SPN.

SPN is an unusual service. It forms a 24 hour telecasting day by negotiating 'air time' with various program producers. The editor/publisher of **CSD (Coop)** had a program on SPN for a year back some years ago called **Satellite Magazine**. Some of the program producers on SPN are well enough funded that they have been able to stay on the air before the big bucks start coming back. Many others have not been, or like Coop's Satellite Magazine, they were simply 'give-away programs' from the outset. A few have been on for a year or more; most seem to go into and out of the schedule in 3 to 6 month cycles. SPN found itself with the opportunity, early in 1980, to dispose of transponder 21 on F1 for big dollars. The interested buyer was something called Premiere; a company formed by four of the largest movie producers in the world and the Getty Oil Company. Premiere was planning to launch a very special premium movie service; one that would bring movies to cable homes far sooner than they now arrive there via HBO et al. Premiere however had some serious legal problems with the concept and late in 1980 Premiere was told by a federal judge that it was configured in an illegal manner. But by the time this happened SPN had taken its big bucks for transponder 21, and unable to locate another transponder on F1, moved to WESTAR III, transponder 9.

Ed Taylor, faced with the same problem in 1980 that worried programmers in 1977-78 when HBO was battling with RCA, plowed some of his transponder 21 sale receipts back into providing free or almost free earth terminals for more than 100 of the largest cable TV systems. By providing the large systems with terminals, Taylor made it possible for SPN to move to WESTAR III and 'take his audience with him'. This move, generally rated as successful by Taylor, broke the concept of cable being totally married to RCA.

The question of one or two (or more) cable TV 'birds' really was resolved prior to Taylor's innovation. RCA was scheduled to launch a new satellite (F11) in December of 1979. The **launch**, as most are aware, went off alright. The rocket move that causes the satellite to 'transfer' from a low earth orbit into a geostationary/Clarke orbit some days later did not fly very

well. **FIII was lost in the injection orbit action** and has never been heard from since. RCA had been scheduled to locate FIII at 132 degrees west and at that time FI would have been adjusted slightly west to 136 degrees to maintain a 4 degree separation between the birds. It is worth noting that RCA asked the FCC for permission to leave FI at 135 degrees for some period of time to 'test 3 degree bird to bird spacing' and the FCC had not formally acted upon that request when FIII disappeared.

More than FIII disappeared. RCA may have lost an important round in the orderly development of a mature geostationary orbit belt for North America. At the time of FIII's loss, there were approximately 12 additional cable programmers not then on FI waiting to launch their services. Included were firms such as CNN, LVEN (Las Vegas Entertainment Tonight), CineAmerica (channel for folks over 40) and others. Each **was ready** to begin their programming services on FI or FIII early in 1980. After the loss, only CNN was able to gain space on FI and then only after a lengthy court battle with RCA.

At the time of the FIII launch, the plan was as follows:

1) Each of the then operating programmers on FI would move to FIII. Because FIII was to be dedicated to cable TV, there would be perhaps 5 additional transponders on FIII (over the number then available on FI) to accommodate five new services.

2) Those that did not fit onto FIII were to have turned on **back on FI**. RCA said that it could accommodate up to 11 additional CATV program services on FI after the FIII launch; the two then totaled 35 channels of video service.

It was in this era that RCA coined the term '**CableNet One**' and '**CableNet Two**'. This was supposed to mean that there would be two separate birds for cable; both of course provided by RCA. The concept that both would be fairly close together in space (132 and 135/136 degrees) was liked by the cable industry and the western orbit belt positions made it

possible for Alaska and Hawaii to also share in the service.

The loss of FIII prompted several things to happen. The first problem facing RCA was finding a home for those dozen or so services that were then ready to launch on FIII or FI. They did this by working out an agreement with COMSTAR (AT&T) which set aside 11 transponders on D2 for cable's 'temporary use'. That agreement runs until late this year. The Cable News Network was successful in forcing RCA to give up a transponder on FI (14) because it, like HBO, had certain 'old rights' that went back to the early days of satellite user/RCA agreements. RCA did not give in willingly; it placed CNN on TR14 as a temporary measure on June 1, 1980 and then CNN had to battle RCA in court to stay there. CNN won and in the process assured itself of a transponder on FIII when the **R version (for replacement)** is finally launched. This brought out howls from others such as Galavision who felt they had every bit as much right to a transponder on FIII (R) as CNN. Those battles still loom on the courtroom horizon.

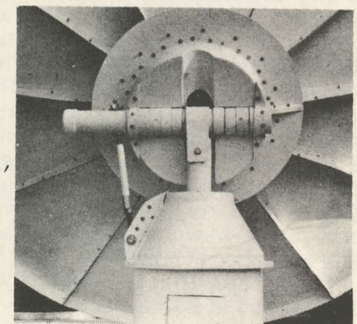
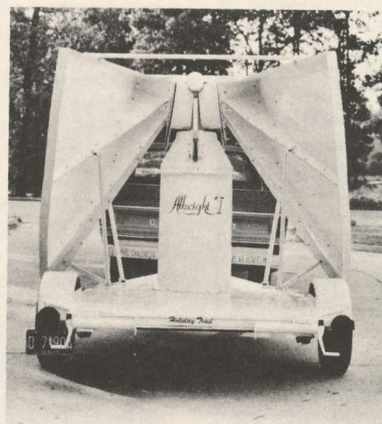
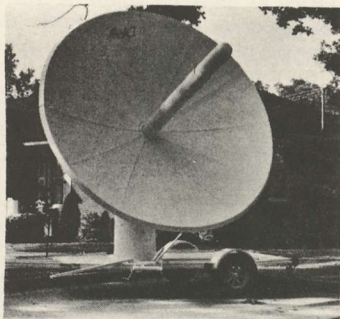
While RCA was working out a deal with COMSTAR D2 (the first user of D2 popped up late in the summer of 1980) the cable programming world was enlarging. Firms previously anti-cable, such as CBS, announced they would create cable programming and would utilize the satellite as a delivery vehicle. By the start of Fall in 1980 it became apparent that the 24 dedicated transponders on FIII (R) and the 11 set aside for 'future cable growth' on FI were not going to be adequate to contain cable's growth. RCA quietly went back to the drawing boards to try to find a way to dedicate not one but two **full satellites** to cable; a total of 48 transponders.

There were some additional pressures on RCA at that point. WESTAR I and II birds, both 12 channel as noted, were going to be replaced with newer WESTAR satellites in 1982 or so. The replacements would be 24 channel and RCA saw in this exercise the possibility that WESTAR, formerly limited to 12 channels and therefore not really competitive with RCA for cable's business, might become a force to be reckoned with.

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CBS Cable, through parent CBS, Inc., was openly interested in WESTAR rather than SATCOM; a hold over from the decades of battles fought between the RCA owned NBC network and the CBS network. RCA may have been worried that with CBS Cable leading the way that CableNet Two may form on a new WESTAR 24 channel satellite rather than on a new RCA satellite. SPN had opened the door a crack but the limited commercial appeal of the SPN service was not worrying RCA too much. If SPN was joined by CBS and perhaps others...well, that would be a whole new ballgame. RCA announced plans for a fourth satellite (FIV) which would be 'CableNet Two'.

At this point in time the FCC threw a monkey wrench into RCA's grand plan; they decided to release a 1980-1990 'game plan' for the launching and geostationary positioning of the C band (3.7 to 4.2 GHz) satellite family. The FCC had been under intense pressure to create a full orbit 'allocation table' for several years. With the loss of FIII, and with RCA losing momentum the Commission felt renewed pressures from old and new groups to deal with the question of which bird would be located where. Up to that point the sky had pretty much been available on a first-come, first-to-select an-orbit-position policy. The Commission would change that.

In mid-fall of 1980 the FCC announced which firms would be able to launch satellites, and where those satellites would be positioned; starting at 70 degrees west and ending up at 143 degrees west. Before the FCC Announcement RCA had what they considered to be 'permanent' locations nailed down at 119 west, 132 west and 135/6 west. After the FCC announcement RCA had a permanent position at 131 west (FIIIR) and two replacements at 139 west and 143 west. They also picked up a location at a far eastern edge of the belt; 83 west. This threw RCA's careful plans for CableNet One and Two at 132 and 135/6 into a cocked hat.

RCA's two western positions, 139 and 143, were logical; RCA has the contract through RCA AlasCom to provide most of the traffic into and out of Alaska and from those two western locations Alaska traffic would be in good shape. From 143 service could, if planned for and desired, even reach as far west as Guam; a US territory. The 131 spot was a replacement for RCA's self picked 132 location and it was not a major change. But the 83 west spot was another matter since it is too far east to provide coverage into Hawaii and Alaska and portions of the western USA could have some low look angle problems. And cable TV, being a 50 state national service, was clearly going to have some problems with CableNet Two located on a bird at 83 west.

The prime spots, for covering all 50 states, would appear to be west of the Canadian group of allocations, which start at 104 degrees west and extend to 115 degrees west. That indicates that 119, 123 and 127 were the right spots for CableNet Two; plus the old FI location at 135 degrees.

If RCA lost the necessary 'two' prime spots so located that CableNets One and Two could be RCA birds, someone else obviously gained. Winning spots at 119 and 135 degrees were SPCC (Southern Pacific Communications Corporation) and Hughes Communications. The 123 spot stayed with WESTAR and the 128 spot became 127 for COMSTAR IV. SPCC had told the Commission it wished to concentrate on 'narrow band' business communications and it received another allocation at 70 degrees west for that purpose. So much for 119 degrees. That left Hughes with their 135 allocation, plus a second at 74 degrees.

Surprisingly, the cable industry never really focused on the location of RCA's CableNet Two bird (SATCOM FIV at 83 degrees) until very recently. The catalyst that caused the cable folks to notice this far eastern location was an aggressive promotional and sales program mounted by Hughes during the late May NCTA national cable trade show. Hughes came along with the announcement that they were going to offer their 135 degree west position bird to the cable industry. They call their new (1983 launch) bird 'GALAXY I' and it will have 24 transponders on it.

Hughes is proposing, subject to FCC affirmation, a unique approach to 'selling out' GALAXY I; they are offering to sell (rather than lease/rent) transponders. Now at the moment FI users pay upwards of \$1,000,000 per year for each fulltime transponder they have leased. Premiere however reportedly paid several times that for the **rights** from SPN to rent transponder 21 on FI so it would appear that in some eyes the value of a transponder is greater than the lease charges being collected by RCA and perhaps WESTAR. Inside the cable industry it is reported that discussions with Hughes GALAXY operators are in the \$15,000,000 region. Hughes plans to sell 18 of the 24 transponders, retaining the other six for emergency restoration (i.e. backup) service. Hughes also claims it is trying to 'handpick' a proper 'mix' or 'balance' of programming services for GALAXY I so that there will be a wide variety of cable oriented programming on the bird. If the bird is good for 10 years life (with the backup transponders) that works out to \$1.5 million per year; not that much above what RCA now charges for leased transponders.

RCA is responding by trying to carve out financial deals with those programmers they intended to see operational on FIV. The whole scenario is still too new to forecast the outcome however.

The number game plays through all of this none the less. If CableNet One, FIIIR, will have 24 cable programming transponders available; and Hughes offers 18 more on GALAXY I, totaling 42 transponders. If 35 total (FIII and FI) was turning out to be too few to do the job for cable in the spring of 1980, is 42 enough in the middle of 1983? Most would guess it is not. Some cable industry prophets suggest there will be as many as **100** cable program channels on satellite **by 1985**.

Since total numbers of transponders is an important consideration here, let's see just what might be available **in 1985**. Once we know what we have to work with, we can figure out how we are going to get there.

First the facts:

Location	Bird	Video Available
70	SPCC	None planned
74	GALAXY 2	Up to 18
79	TDRSS 1	None planned(*)
83	FIV	Up to 23
87	COMSTAR	None planned(*)
91	TDRSS 2	None planned(*)
95	COMSTAR	Up to 12
99	WESTAR IV	Up to 18
119	SPCC	None planned
123	WESTAR V	Up to 18
127	COMSTAR	None planned(*)
131	SATCOM 3R	23
135	GALAXY 1	18
139	SATCOM V	Alaska only
143	SATCOM VI	Alaska only

That totals 130 video available transponders; maximum. Additional may be available (*) indicated) on TDRSS 1 and 2 and the three COMSTAR birds. TDRSS is the advanced C and Ku band bird family designed for military and scientific work primarily; Western Union will have **some** C band capacity to rent out but it is unlikely to be available to cable or other 'low grade' video users. COMSTAR birds only allowed cable on D2 as an interim measure and corporate policy seems to preclude dealing with cable at all directly. That does not preclude COMSTAR birds being used for **network** TV however.

Which brings us to the next set of facts. Cable TV is not the only video programming game in town. PBS now utilizes 3 or 4 transponders and they are talking about adding several more. ABC, CBS and NBC are presently using as many as a half dozen each day for various periods of time and with the recent launch of NBC 'tests' on COMSTAR for feeding of NBC programming, that six number could grow substantially by 1985. If each of the three networks chose to send separate time zone feeds out that is 4 x 3 or 12 transponders. Throw in

other network use such as the six transponders now in use and you reach 18. A 'safe number' for the broadcast industry is larger than 18 by far, some suggest a minimum of 30 by 1985.

Then you have the STV / pay TV broadcast group, currently represented by the VEU service on WESTAR III but promising to grow to perhaps 8 transponders in near full time use by 1985. Add to this the unknown quantity of transponders to be used by groups such as 'Neighborhood TV' (the LPTV system that is backed by Sears Allstate Fund and which was filed applications for 150 LPTV stations). That could account for at least four more transponders.

To further muddy the water there is the explosive growth of narrow band audio and data links. SPCC says their two birds (48 transponders total) will go after this market but at least a few of the 'video available' transponders in our 1985 scenario are likely to fall into that camp as well.

Here you have a total 'window'; not a hard number. It is someplace between 50 and 60 transponders required. Whatever the number, it must be subtracted from the total available of 130. And that suggests that well under 100 will be available for cable use by 1985.

If you take a more cautious approach, you might decide that perhaps 50 cable-video transponders will be required by 1985. We'll look at that number again later in this report as we detail those now operating plus those that say they will be operating by the middle of 1982. If 50 is the real number, where will they come from?

FIIR will have 23; GALAXY would add 18 more. That's still 41. Or FIIR plus FIV with 23 each would be 46. Close to 50 but the eastern orbit position of FIV raises the Alaska/Hawaii problems. Meanwhile, whether FIV or GALAXY win the 'Cable-Net Two' battle, WESTAR III seems to be developing more than a casual working relationship with numerous cable programmers. And the fact that Western Union will launch a 24 channel WESTAR IV bird and replace WESTAR I's 12 transponders at 99 degrees around March of 1982 certainly is worth consideration. Further, Western Union will replace WESTAR II with WESTAR V in November of 1982. **Both** of these new 24 transponder birds will be operational **before** GALAXY I is lifted from the pad. And with one at 99 degrees and one at 123 degrees, there is a 'orbit position advantage' that FIV will find difficult to work against.

It is confusing!

Hughes' GALAXY I bird sales pitch is that they have good position (135) and they are willing to deal by selling rather than renting. Hughes also has some other aces in their hand; they are a major supplier of TVRO terminals and have an established working relationship with the cable industry. If it takes providing terminals to cable operators to point at GI to sell the program of cable programmers using GI, they can be expected to do just that. SPN did it with far fewer dollars at stake on the table.

If Hughes might be willing to 'cut deals' to fill up their bird, Western Union has shown less open enthusiasm for the cable business to date. Lacking the transponder resources, and being pretty much sold out anyhow without the cable business, the WESTAR management has only fleetingly courted cable programmers. There is no real indication this 'stay away' policy is changing, even with the 24 channel birds coming into operation in 1982 and doubling their present capacity with I and II. RCA however prefers to deal with programmers who will take a full 24 hour block of time and for some of the up and coming programming firms that is far down the road. Western Union seems to be easier to get along with for shorter time blocks and SPN excepted (a 24 hour operation) it would appear that this may send some of the newcomers to WESTAR what-ever for at least the interim period.

Just who are all of these up and coming new programming sources, and what will their time demands be?

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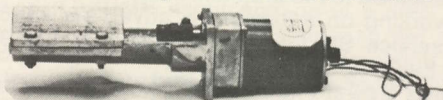
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- 1) **UTV** - UltraMedia Network. A new firm that wants to start **1 September** with a 12 hour broadcast day using advertising support. They plan to share their ad revenue with the cable affiliates.
- 2) **MSN** - Modern Satellite Network. They are presently on FI, transponder 22, with a block of 'daytime' hours. However they have made a deal with something called BETA to relinquish most of their daytime block starting January 1st and they are now shopping for a new home. Their present needs are around 5 hours per day.
- 3) **RCTV** - RCA and Rockefeller Center. They plan a 'premium' as in 'pay' service, 12 hours per day using BBC and other drama and children's fare. Their start date is January 1, 1982.
- 4) **RCA**. In addition to the premium service channel (RCTV) RCA is working on a 'basic' (i.e. advertiser supported) channel service. Start date for it no sooner than 9-1-82. Likely to be 24 hours per day.
- 5) **Dow Jones News**. Planning a 24 hour 'news channel', not unlike the CNN concept.
- 6) **CNN** - Cable News Network. Now talking about adding a **second** transponder so they can do split time zone feeds for east and west coasts (ala HBO, SHOWTIME). Another 24 hour per day user.
- KUSK** - Neighborhood TV. The LPTV network announced last fall with Sears backing. They have a 150 LPTV station network formed, plan to be on 18 hours per day, and a late 1982 start with country and western programming.
- EROS** - "Movies you won't see anyplace else". Someplace between 'hard' R and X. An 8 to 10 hour per day service.
- 9) **Victorian Video**. "Erotica to the taste of those wild". Like EROS, between R and X. Between 6 and 8 hours per day.
- 10) **QCN** - Quality Cable Network. "Most lavishly produced adult entertainment." Again, between R and X and 8 hours per day.
- 11) **USA Today** - Gannett Newspaper Chain. No firm announcement of format but thought to be a CNN/ features "electronic newspaper"; 24 hours per day.
- 12) **U.S. Senate** - C-SPAN. If the U.S. Senate approves TV coverage, a second channel for C-SPAN for Senate Coverage; averaging 8 hours per day.
- 13) **U.S. House** - C-SPAN. The present use of transponder 9 is temporary and USA Network has notified C-SPAN it will have to move by 1982 or early 1983. Another 8 hours per day.
- 14) **Health Care Channel** - Dr. Art Ulene. A 6 hour per day (12 noon to 6 PM eastern) service scheduled to start up January 1, 1982.
- 15) **GAMMA** - ABC. A 12 or 24 hour (no decision yet) all news and sports event channel scheduled to begin service January 1, 1982.
- 16) **Time, Inc.** - National Videotext Service. A non-video full transponder data channel to be sold via cable TV systems in conjunction with special decoders. 24 hours per day.
- 17) **CONSAT**. A 6 hour per day 'music concert channel' scheduled to begin **this month** (July) feeding live musical concerts and taped musical numbers to clubs and lounges with cable feeds or private terminals. Lounges will charge \$3 per head for entry fee.

In addition to this there is also the long ago announced American Satellite Network which took over the operations of LVEN / CineAmerica late in 1980 after the twin services did not get into operation on D2.

Now these are the **front running** (but hardly the only) announced services which would appear to be shopping for transponder space. Some (such as Health Care Channel) can

be sandwiched into nighttime service channels because of their daytime schedule. The total number of new transponders represented here is not 17 but it is not far below that number either.

The FI to FIIR Switch

If any part of this bowl of jelly seems like it should be secure, the present group of operators on FI should have it pretty good. Right? **Wrong.**

First of all we have some sub-letters on FI; programmers who are using, under agreement, transponders that really belong to somebody else. For example...

- 1) **TR 9** - as noted this one belongs to USA Network. Both C-SPAN and BET (Black Entertainment Television) also use some of the transponder week. BET will probably get to stay for awhile (they use late evening hours on weekends only) but C-SPAN already has been asked to start looking.
- 2) **TR 16** - is a real can of worms. An outfit called COMPACT VIDEO is the principle landlord. They do remote broadcasts. During the daytime Appalachian Community Services Network uses the transponder. At night you are likely to see almost anything here. The current tenant is called **CMN** (Christian Media Network), a new start-up outfit that is trying to fill in whatever holes as are left from PTL and CBN. Actual lessor of transponder is SHOWTIME which acquired it when they took over now defunct FANFARE movie service in 1979.
- 3) **TR 17** - Although WOR is here the transponder lessor is SHOWTIME (again). The movie firm has from time to time quietly reminded WOR's common carrier Eastern Microwave that it could take it back at anytime. For now WOR seems firm but eventually they will probably have to move...someplace.
- 4) **TR 21** - Although in use in evenings (expanded schedule 7 PM to 1 AM eastern) by Home Theater Network, this one is now owned by ill-fated Premiere. Future disposition uncertain.

Then we have the 'extra power' element that enters into the 3R switch. Now what is that all about? Well, RCA is working on upgrading their FV and FVI birds so that **each** of the 24 transponders on board will have 8.5 watts of power (rather than the present 5 watts). This increase will mean that on the ground the SATCOM V and VI transponders will be 2.1 dB or so stronger than 5 watt transponders would be at the same place. That's a substantial increase; it will make ten footers look like present day 15 foot TVROs.

Now to get to FV and FVI RCA has built **four** of these **8.5 watt transponders** into F3R. They have also built in a spare output amplifier stage capable of being switched to any transponder within an antenna set in case a transponder should prematurely fail due to TWTA failure. Here's how all of that will work on F3R:

- 1) **20 transponders** will be **5 watt** level; the same as at present. **Four** will be **8.5 watt**.
- 2) F3R will, like FI and II, have **four separate transmitting antennas**. Each transmitting antenna will handle six transponders. The bird will have the ability to direct different boresights for each of the four transmitting antenna sets but it is likely they will all conform to the same pattern or as close as they can make it work that way.
- 3) **In each bank** of six transponders there will be a sixth 5 watt TWTA amplifier stage along as a switchable 'spare' plus a single 8.5 watt TWTA stage.
- 4) The antenna-transponder sets on all RCA birds are as follows:
 - A) Transponders 1,5,9,13,17,21
 - B) Transponders 2,6,10,14,18,22
 - C) Transponders 3,7,11,15,19,23
 - D) Transponders 4,8,12,16,20,24

In your own 'observing' you should be able to notice similar signal levels at your location from all transponders in the same 'set'. Exceptions to this 'rule' are transponders 2,3,6,8,

10, and 12 which have an extra sub-carrier or two operating (extra sub-carriers 'rob' power from the main video carrier) and 21 which just looks awful from coast to coast for reasons only RCA understands.

Now RCA could design the F3R bird so that the 8.5 watt transponder would be anywhere. They elect to assign one per antenna-transponder group. That means **one transponder in the 1-21 group**, one in the 2-22 group, one in the 3-23 group and one in the 4-24 group can have the extra 2.1 dB on the ground. Since these higher power transponders are going to be worth more to the users (cleaner on ground signals, possibility of scrambling without signal to noise degradation, etc.) one might suspect that there is intense in-fighting over which transponder **user** will get the 8.5 watt TWTAs. There is, but it has been kept very quiet.

At this point no announcement has been made as to who will get the extra powerful transponders. Now you may ask why some of the above listed antenna-transponder sets are **bold face**. Each one of those bold faced are owned by RCA's pioneering cable programmer HBO. Notice how cleverly there is **one per antenna set** in HBO hands. And remember that RCA and HBO have a relationship which goes way-way back. To the beginning.

This is a guess. We admit it. But we will not be surprised to learn that HBO ends up with the extra powerful transponders. Or as an absolute minimum, two of them (22 and 24 anyhow). Now what will that buy HBO besides the potential to be stronger on the ground?

It opens up considerable new marketing opportunities. If they can serve ten foot dishes where others have to have 15 foot dishes, HBO now has a leg up on competition. BUT - **they could also elect** to take that extra 2+ dB and give some of the signal away by going to a scrambling technique. HBO has been the loudest proponent of scrambling of their pay service of any of the pay programmers. Unfortunately, many of their present customers (i.e. cable systems) have installed dishes which produce just (barely) out-of-noise pictures with the **present** EIRPs. And since most of the relatively inexpensive scrambling techniques trade scrambling for noise increases, there has been no way for HBO to push scrambling onto their affiliates without getting the affiliates into the noisy picture business. By going up to 8.5 watts output power they could

afford then to scramble, give up as much as 2 dB of signal in the scrambling technique, and still end up where they are now in signal-to-noise **without scrambling**.

If HBO had their way, they would end up with all four of the 8.5 watt transponder channels. RCA may not be able to deliver on that without raising problems with others such as SHOWTIME. As long as RCA had both CableNet One and Two sown up they could pull a power play like that. But with WESTAR and GALAXY on the horizon (so to speak) they might not be able to get away with it. So let's see how that could turn out.

If HBO has to make a decision about scrambling just part of it's services (now CINEMAX, HBO proper and soon to include a National Videotext which is scrambled to begin with), it will undoubtedly opt for scrambling on the east and west coast channels of HBO proper. **Today** that says transponders 22 and 24; both on different antenna sets.

Unfortunately, SHOWTIME is on 10 and 12 and 10 falls along with 22's antenna set while 12 falls on the same antenna set as 24. But recall that SHOWTIME also owns 16 and 17. 16 still conflicts with 24 but 17 is clear of HBO's senior service. SHOWTIME might engage in a little transponder swapping to get onto the 3-23 antenna set to pick up a second 8.5 watt transponder. Pure speculation but possible and if possible, then both SHOWTIME and HBO could afford the 'luxury' of scrambling.

Now what about the oft repeated rumor that SATCOM's in the future will have **all 24** channels at the 8.5 watt power level? Well, the SATCOM IV bird, now being pushed by RCA as CableNet Two, will be configured just like 3R; **four** 8.5 watt transponders. That still creates two classes of users; those who are powerful (4 total) and those who are stuck at the five watt level (20 total). The first SATCOM to have all 24 transponders at the 8.5 watt power level will be birds V and VI. **They are 'end of 1983 birds'**...and, they are now scheduled to replace FI and FII. At new locations. When FV flies it will replace FI. FI is now at 135 degrees west but in 1983 FI will end up at 139 degrees west while GALAXY I moves into the 135 spot. And then FI will be replaced with FV; the first 8.5 watt/all channel bird. **And it will be dedicated to Alaska service.** Finally, when FVI flies it will find F2 already moved to 143 degrees west and there it will **also serve Alaska**.

THE PROGRESSIVE DEVELOPMENT OF VIDEO SATELLITES

Video 1981 (7-01-81)

135 West FI	20 transponders
123 West W2	2 transponders average (81-*)
119 West F2	3 transponders average (81-**)
114 West A2/A3	3 transponders average (81-***)
109 West AB	5 transponders average
99 West WI	7 transponders average (81-*)
95 West D2	5 transponders average (81-****)
91 West W3	6 transponders average (81-*)
87 West D3	1 transponder average (81-****)

52 total transponders

Video 1982 (6-01-82)

135 West FI	3 transponders average
131 West F3R	23 transponders average
127 West D4	6 transponders average (82-*)
123 West W2	3 transponders average (81-*)
119 West F2	3 transponders average (81-**)
114 West A2/A	7 transponders average (81-***)
109 West AB	5 transponders average
99 West WIV	17 transponders average (82-**)
95 West D2	1 transponder average
91 West W3	6 transponders average
87 West D3	1 transponder average (81-*)
83 West FIV	10 transponders average (82-****)

85 total transponders

Notes:

81-* / In September the amount of video 'traffic' on WESTAR II is expected to increase because of Wold and other program feed additions. **81-**** / Two regular transponders (9, 23) for Alaska plus one (8) for NBC feeds. **81-***** / In September CANCOM is scheduled to begin uplinking four Canadian 'super stations' on A2/A3 bringing total there to 6 or 7 regular video transponders. **81-****** / Temporary 'CableNet 2' services. **81-******* / Single transponder currently in use for feeds to Puerto Rico at uneven times.

82-* / Likely to be NBC/CBS/ABC plus Wold transponders for feeds to broadcasters. **82-**** / Combination of 5 Westinghouse plus other new services planned, on top of present WI users that will transfer to WIV. **82-***** / 'CableNet Two' made up of those who could not get space on CableNet One.

With so many variables involved in the re-assignment of FI services to F3R you may begin to see the light; **until RCA decides to announce** the assignment table there is no real way of knowing which transponder will be occupied by whom. Between the new transponders to be filled on F3R and the 8.5 watt power level game, and, the sub-let status of people such as WOR and CMN the exact line-up of users on F3R is impossible to predict. We suspect that RCA is not yet sure. We can at least, however, attempt to identify **whom** they are likely to be. We'll do this by assigning the present users to the same F3R channels (stating that this **may change** in some instances) and then filling in the rest with a random selection process:

- 1 - **NICKELODEON** until 9 PM daily; then ABC ARTS cultural channel service to 3 AM eastern.
- 2 - **PTL** plus recently inaugurated 6.2 MHz subcarrier Satellite Radio Network (Christian).
- 3 - **WGN** Chicago plus WFMT (stereo) on 5.8 MHz, See-burg Music on 7.5 MHz presently; two additional sub-carrier services (24 hour country and western, 24 hour MOR) being added August 1st.
- 4 - **New** with F3R. Times Mirror 'Shopping Channel' daytime (with Comp-U-Card of America) and Times Mirror 'Spotlight' premium movie service evenings.
- 5 - The **Movie** Channel.
- 6 - **WTBS** plus multiple subcarriers.
- 7 - **ESPN**.
- 8 - **CBN** plus announced 5.58, 5.94, 6.30 Continental Broadcasting subcarrier, music service and 7.56 Continental Broadcasting news service.
- 9 - **USA** Network plus C-SPAN and BET for now; possibility that CBS may become part of USA operation and change scope of channel radically.
- 10 - **SHOWTIME** west coast
- 11 - **Warner** Music TV (MTV), 24 hour pop music with video disc jockies, to begin August 1st. Free service, advertiser supported.
- 12 - **SHOWTIME** east coast
- 13 - **HBO** (recently obtained from Trinity); possibly Video-text system use.
- 14 - **CNN** - Cable News Network
- 15 - **New** with F3R. NCN (National Christian Network) day-times; Escapade and Bravo expanded to 10 hours per day split between two, evenings.

16 - **SHOWTIME** will continue to have 12 hour use; look for ACSN to continue daytimes but new evening service to emerge.

17 - **REUTER s** owns rights to transponder fulltime and sublets to GALAVISION in evening. GALAVISION has attempted to force RCA to rent it transponders of its own for two years, without results. Matter before FCC and may end up in courts. Likely prospect that GALAVISION may be forced to another bird and a new evening service may appear here.

19 - **RCA** is keeping one transponder back as a spare.

20 - **HBO** CINEMAX east coast.

21 - **Owned** now by Premiere but used in evenings by HTN. Last ditch court appeals to bring life back to Premiere failing, this one will be sold to highest bidder. HTN will then have to find a new home.

22 - **HBO** west coast.

23 - **HBO's** CINEMAX west coast.

24 - **HBO** east coast.

Whew. And that is just a **single** bird!

COMSTAR D2

Regardless of who wins the battle for the permanent bird position as CableNet Two, there are firms now occupying transponder space on COMSTAR D2 and they will have to find a home someplace when D2 shuts down this coming spring. RCA has the timing worked out so that those left on D2 after F3R becomes operational can stay there until FIV goes into operation around February or March. This places those with such temporary space in a bit of a tight spot.

1) They can back RCA's move for FIV to become CableNet Two and move promptly onto the fourth SATCOM when it is operational;

2) They can go out of service and wait for GALAXY I to come along in May of 1983;

3) They can find a temporary home on WESTAR or they can opt for a permanent home on WESTAR.

The truth of the matter is that the COMSTAR D2 use, as a 'temporary stopgap for FIII', never got into high gear. RCA had 11 programmers standing in the wings when FIII disappeared. When it came time to show up on D2 many of them did not appear. About half to be exact. Some people in the cable industry feel there is a message here. And that is?

THE PROGRESSIVE DEVELOPMENT OF VIDEO SATELLITES

Video 1983 (1-01-83)

135 West FI	3 transponders average
131 West F3R	23 transponders average
127 West D4	10 transponders average (83-*)
123 West WV	15 transponders average (83-**)
119 West F2	3 transponders average
114 West A2/A3	7 transponders average
109 West AB	5 transponders average
99 West WIV	12 transponders average (83-***)
95 West D2	1 transponder average
91 West W3	6 transponders average
87 West D3	1 transponder average
83 West FIV	15 transponders average

101 total transponders

Video 1983 (7-01-83)

139 West FI	8 transponders average
135 West GI	18 transponders
131 West F3R	23 transponders
127 West D4	15 transponders average (83-2*)
123 West WV	15 transponders average
119 West F2	3 transponders average
114 West A3	4 transponders average
109 West AB	5 transponders average
104 West AC	
99 West WIV	12 transponders average
95 West D2	1 transponder average
91 West W3	6 transponders average
87 West D3	1 transponder average
83 West FIV	8 transponders average (83-2**)

117 total transponders

Notes:

83-* / Growth of TV network use of satellite feeds reflected. **83-**** / Launch of WESTAR V to replace WESTAR 2, movement of all 10 Westinghouse transponders to WV. **83-***** / Shifting of some of the WIV load to WV after launch of WV.

83-2 / Reflecting high activity from TV networks. **83-2**** / Reduction in FIV 'CableNet Two' loading after operational turn on of GALAXY ONE at 135 degrees west.

"When CableNet Two finally gets started many of those who **say** they are going to be on the bird won't show up either". The cable industry has always been filled with 'hype'; this could be another example of the same.

Still, there **are** a few holdovers on D2 who will not be accommodated on F3R. They include the following:

- 1) **ESPN** - they were originally assigned transponder 6 on D2; a transponder they intended to use initially to feed remote sporting events back to the Bristol, Connecticut headquarters where it would be processed and sent out on FI, TR 7 for normal viewing.
- 2) **SIN** - Spanish International Network. They are related to Galavision and have toyed with using transponder 8 for either Galavision or for a SIN feed to cable systems.
- 3) **Rainbow Communications** - was originally assigned transponder 11. The transponder subsequently traded hands and the present owner has certain 'rights' vis a vis CableNet Two.
- 4) **KTBN** - Trinity Broadcasting. Trinity ended up on D2 13 after their FI 13 quit working. Trinity feeds TV stations in their growing network via this transponder, and has apparently backed up from an earlier plan to encourage cable systems to use their religious programming feed (24 hours per day). Recently, they **swapped** their 13 on D2 for 17 on D2, **with HBO**. In the process KTBN is guaranteed a spot on CableNet Two, if it wants it, **but gave up its right to FI/F3R's 13 to HBO**. This is how HBO ended up with a transponder on the fourth antenna set on F3R. Trinity will still need a home on CableNet Two.
- 5) **SHOWTIME** has rights to transponder 15 on D2. This would be their 5th. They have allowed it to sit since D2 became active but are entitled to a CableNet Two transponder.
- 6) **HBO** has rights to transponder 18 on D2 and has been using it to feed the east coast version of their service

since late last summer. That entitles them to a transponder on F3R; that remains to be sorted out. If they don't, they still have a slot coming on CableNet Two.

8) **Warner/Amex** has rights to transponder 22 on D2 although to date it has not been used. Coupled with their transponders 1, 5, and 11 on FI/F3R this would give them a total of four. They also have an interest in a fifth transponder.

9) **Times Mirror and United Video** share the ownership of transponder 23 on D2. United 'won' it in the assignment process; Times Mirror bought them out. United operates as the common carrier for WGN (TR 3 on FI/F3R). Times Mirror has the 'Shopping Channel' service operational and plans to bring their premium service 'Spotlight' to the bird as early as this fall on a **regular** basis.

Allowing for defections and no-shows it would appear that we have **at least six** real world users for CableNet Two at this point in time from **that** group. To that you would have to **add** the earlier list of 17 'announced services' who are still shopping for a home. That would total 23 or more and if say 70% of them were really ready to go on the bird by the middle of 1982 we'll have at least 15 operational channels on CableNet Two.

The WESTAR Wedge

Meanwhile on WESTAR III we have a small but growing army of 'maverick' services who are pushing the concept that putting all of cable's program apples into a single satellite operator's basket is a dangerous precedent. As noted, SPN led the trickle away from RCA just about one year ago.

Of the three presently operational, WESTAR II had lots of video several years ago but Western Union has re-configured it so that now it is largely a data and narrowband bird. The Independent News Network 9 PM eastern feed (weekdays; 9:30 PM eastern weekends) is one of the few day-to-day



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scheduled video programs seen on this bird. However that may change this fall when several new broadcast oriented daily services come into operation.

Western Union **has been** aggressive in selling transponder space. Robert Wold, the entrepreneur who packages sport and entertainment events for satellite distribution, feels Western Union may have become too aggressive. He recently filed a formal complaint against Western Union at the FCC claiming "**Although Western Union is a common carrier, it has been selling satellite transponders on a selective, untariffed basis to companies whose requests for service came after 'established' user requests.**" WESTAR birds have been essentially 'full' (at least during peak day periods) for almost one year. WESTAR's new IV and V birds, due to become operational during 1982, will have 24 transponders each, as previously noted. Western Union has been lining up customers in advance; **Westinghouse** has agreed to take ten of those 48 transponders for example. Wold claims his firm has had a request on file for **three additional transponders since 1978**; a request yet to be filled while later firms have come along with orders and had them filled.

Each satellite, for now, is considered a 'common carrier'. That means the rates charged to users are on file with the FCC; established in advance. It also means that if there is transponder space **available** to a potential customer, the operator of the common carrier satellite **cannot deny** that user use of the satellite. **Period.** Wold says that Western Union has been 'playing games' "**selling off significant portions of these satellites to selected customers on an untariffed basis, at prices which appear to be excessive.**"

Several other groups have indicated they too feel that Western Union may have been using its control over a 'scarce resource' (i.e. transponders) to 'exact excessive prices, on a private negotiated basis'. The Hughes Sports Network, Bonneville International and a group calling itself 'The Pop Network' (requesting four transponders) are in various stages of anger with WU at the moment.

Western Union clearly has a pot boiling; it would like to keep the lid on the pot until WESTAR IV is launched and operational; sometime in early spring. Then at least it will have some additional transponders to satisfy the most vociferous customers.

WESTAR I at 99 west has been largely dedicated to the 3 to 4 PBS service channels plus 3 to 4 other video channels operated by the networks, and groups such as VEU, for more than a year now. PBS, you may recall, was the first US network to 'go to satellite' and virtually all of the PBS station interconnection is now handled via satellite. When WESTAR IV launches and becomes operational early in 1982 it will replace WESTAR I and there will suddenly be 24 transponders in the sky at 99 west.

Westinghouse has cut a deal with WU for ten transponders; apparently five will be on WESTAR IV at first, then five more will be on WESTAR V after it becomes operational late in 1982. There is speculation that the initial five on IV will be moved to V in 1983 making **a total of ten there.** Westinghouse's WU deal is bothering many people. Westinghouse owns a chain of powerful VHF television stations and with its recent purchase of TelePrompTer (and with that, 50% interest in SHOWTIME) is now the largest operator of cable television systems in the nation. They are also into program creation and distribution. They **could** use their ten transponders for virtually any combination of services; CATV, broadcast or original program distribution. So far there have been few details as to what they will do, or when.

One thing **is certain**; with ten transponders available to Westinghouse, and all on one or two of the WESTAR birds, there will be considerable 'drawing power' for other less ambitious programmers to the WESTAR birds. Why? Well, remember that most CATV systems think in terms of fixed antennas locked onto a single satellite. They carefully weigh each new programming service on a new satellite against the cost involved for installing a new antenna. One program

source alone seldom gets them interested in springing for a new antenna. **Several** program sources might. The combination that Westinghouse might offer plus others who will sign with Western Union as a result of Westinghouse 'being there' could be a powerful tool to tip the cable operator's mind. The Westinghouse deal alone could tip the scales towards making one of the WESTAR birds a 'heavy' CATV bird. The reluctance of WU to give up three additional transponders to Robert Wold, for example, suggests this to be the case. Wold **does not program** to CATV systems; he programs to broadcasters and closed circuit locations. Giving him transponders on a bird that WU might secretly wish to become 'CableNet Two' would not fit the WU plan; **if there was one.**

In the interim, or before WESTAR IV (and V), there will be considerable new video activity on WESTAR. Much of it is likely to be on WESTAR III and it will begin in earnest this September. Robert Wold will be producing or distributing some of it. "**Entertainment Tonight**" is a new (September start) 30 minute per evening weekday (60 minutes weekends) spot to originate from Hollywood. More than 70 TV stations have signed up for it; those stations will be fed via the bird. At about the same time the Merv Griffin Show will also go to satellite distribution, in 30, 60 and 90 minute formats. Wold again is doing it and where existing Merv affiliates do not have a terminal...Wold (through Microdyne/AFC) will supply one. A seven meter terminal at that.

Until WESTAR IV is operational it is probable that all three of the existing 12 transponder WU birds will look like 'video supermarkets'. Between this September and next spring, virtually every available transponder will be filled with video programming from the break of day to well after midnight eastern.

In the things to come department, Western Union has announced their plans for yet **WESTAR VI**; a bird that may launch late in 1983 or more likely in 1984. It will also have 24 transponders. And, it will become the first North American domestic satellite to feature 8.5 watt power on **all 24 transponders.** That's the good news. The bad news is that it may not have a home in the sky; unless Western Union is willing to prematurely retire WESTAR III at 91 west. WU went into service only two years ago. A normal life cycle would be seven years minimum. That would suggest it would be replaced no sooner than 1986. It appears however it may become the first satellite to be prematurely replaced because of the rapid advance of technology.

The Alaskan Connection

Oft overlooked by bird watchers is the programming presently on FII (119 degrees) for Alaska. RCA configured the footprints on FII so that 6 transponders (one antenna set) are especially hot in Alaska. This group of transponders (3,7,11,15,19 and 23) carry both data and video (transponder 23) into Alaska. Transponder 23 is used in three ways; first it is used early each day to feed US programming from CBS, NBC and ABC north into Alaska where it is taped. Next, about mid-day in the eastern US, it is used to transmit in-school educational programming from Anchorage into remote Alaskan villages. Finally, late in the day it is used to feed a low power television network (some 60 plus stations now) providing same-day television to rural Alaskan villages. Also on FII is a regular Alaskan Forces Television Network (AFTN) service operated by the US military, on transponder 9, providing stateside and locally produced news and weather programming to American service people throughout Alaska.

The **state of Alaska**, working with some of the huge sums of money coming its way from the North Slope oil fields, has a paper plan for a very ambitious LPTV network. During this past May the state filed applications for 115 new 10 watt VHF (satellite fed) TV stations. When FV and FVI are operational, there is a plan to provide two or more television channels through LPTV local broadcasting centers to virtually every nook and cranny of Alaska. Now remember this service will be provided utilizing the more powerful 8.5 watt transponders

and from western locations of 139 and 143 degrees. There is an interesting side potential coming up here. With the higher EIRPs and the well known SATCOM habit of 'spilling' energy into areas well off of boresight (the FI reception in northern South America is a good example) it is **possible** that US domestic television, via the Alaskan connection, will not only spill over into substantial areas of Siberia but possibly as far south as the most northern islands of Japan.

The COMSTAR Connection

ATT/GTE, operators of the COMSTAR family of satellites, have shown no serious interest in cable TV or other video users until recently. RCA and the FCC combined forces to obtain the present interim agreement whereby D2 is used as a **temporary** CableNet Two but COMSTAR officials clearly want this to be an exception; not the rule.

There are many reasons for this. Down the road, perhaps a decade or less, ATT looks at today's cable television systems as potential serious competitors. Cable TV is changing, fast, and yesterday's 'harmless' cable connection carrying a hand-full of off-air broadcast TV services into the American home is starting to look more and more like a very broadband (**two-way**) communications 'duct'. At some point in time there will be a serious Bell/Cable knock down, drag out fight. One way for ATT to stand at arm's length and to save a few options of its own is to not get in bed with cable in the satellite business.

A more compelling reason is the 'looseness' with which the cable industry runs its affairs. Bell management is staid and straight laced. Cable wanders around in a fog changing its collective mind and charging off in new directions every few months or so. That is not the kind of environment that Bell likes to deal with. Ten year projections are difficult to create when people you are dealing with are 'unstable'.

Bell sees satellites as both a tool and a problem. The **tool** part is where Bell can switch its own narrowband (voice, data) traffic to satellites; simply because satellite transmission is more cost effective and more flexible in many cases than existing landline circuits. The **problem** part is that one of Bell's biggest customer groups, television networks/broadcasters, is openly moving to satellite distribution of programming. Bell fears what may happen to the terrestrial microwave network now handling 99% of all television programming if the rush to satellites gets going too rapidly. They could be left with a lot of excess terrestrial microwave capacity overnight and they might lose the satellite part of the deal as well.

In the TV broadcast business there are two groups at work. The networks, like Bell, like everything wrapped up in neat little bundles. The affiliates, like the cable operators, are more bold and assertive. In spite of the fact that PBS has been virtually totally dependent upon satellite interconnection for some time now (and without any major disasters), ABC, CBS and NBC remain 'unconvinced' that satellite interconnection is the right way to go.

Now PBS has proven, through hard dollar savings, that they can send out **three** separate time zone feeds (eastern, central and pacific) via satellite for less money per year than they formerly spent to send **one** program feed via Bell terrestrial microwave. The commercial networks would find the same increase in flexibility and the same savings. Why then do they stay with terrestrial links?

There are many weak arguments. They claim satellites **might** fail. They claim there **might** be unauthorized use of the programs if they are on satellite. They claim their privacy would be breached. They simply state 'the time is not yet right'.

The truth is far simpler than any of this. With **everything** on satellite the broadcaster would have access to not only his own network programs but the programs from people such as Robert Wold or Westinghouse. Dozens of non-network programs would be just a push button away from local airing, on the station control console. **This bothers the networks** since they can see many of their own programs being 'pre-empted'

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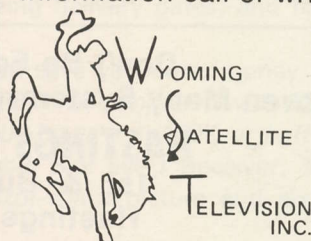
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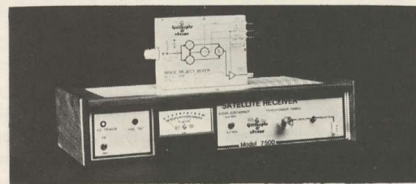
by aggressive, ratings-minded station managers should the stations be given this new access to programming.

Remember that a network 'works' primarily because it is able to 'deliver' reach into millions of homes simultaneously. Each affiliate is an important link to some number of potential homes. When network affiliates, presented with other programming choices, see the opportunity to increase their own ratings by selecting a satellite delivered program rather than the network's offering for a particular time slot, you had better believe a lot of low rated network stuff is going to get dropped.

So the networks are buying time; keenly aware that by the end of this year more than 150 (perhaps as many as 200) network TV stations will have purchased, **on their own,** satellite receiving terminals. And keenly aware than sooner or later some critical mass point will be reached so that firms such as Wold's will be able to bundle together a collection of stations reaching as many homes as NBC now reaches, **for special programs.** That point could come as early as mid-year 1982. **Then the networks** will be ready to move to satellite distribution.

By going with COMSTAR birds, and by working with COMSTAR so that few additional transponders remain available for the Wold's of the world on the same bird(s) as the network services, the networks may be planning to buy a little additional time of dominance over their affiliate's program selection process. Sooner or later however it will all change and the Westinghouse purchase of ten WESTAR transponders may be a major ingredient in that process of change.

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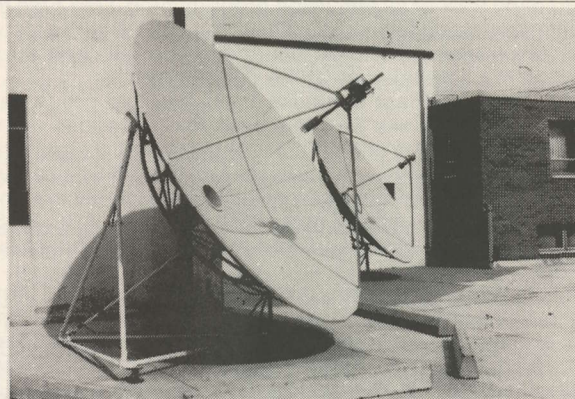
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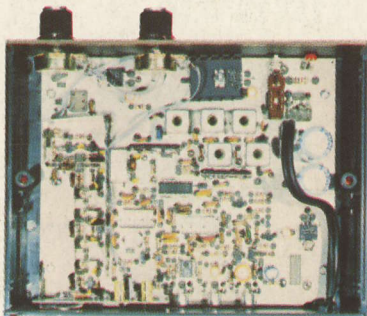
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